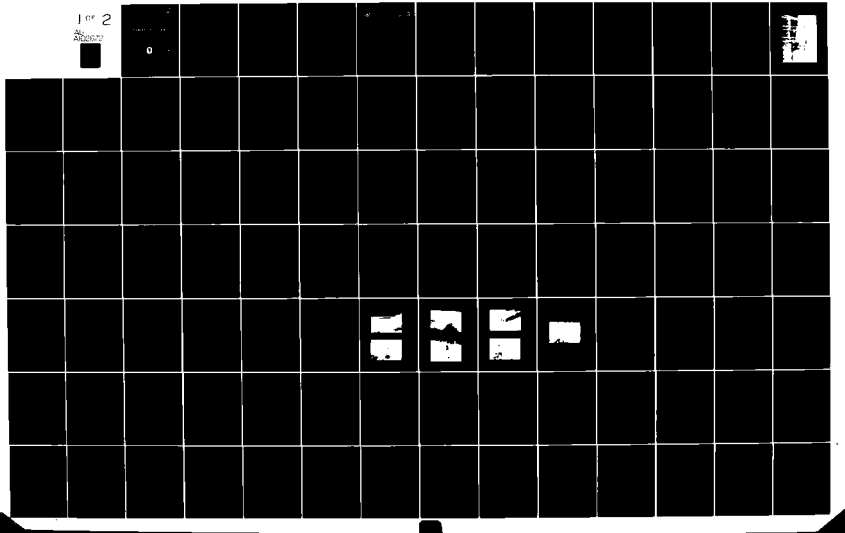
AD-A102 672 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM. KAMPFE LAKE DAM (NJ00772), PASSAIC--ETC(U)
JUL 81 W A GUINAN DACW61-79-C-0011
UNCLASSIFIED DAEN/NAP-53842/NJ00772-81/ NL



LEVEL

PASSAIC RIVER BASIN
TRIBUTARY TO PEQUANNOCK RIVER,
PASSAIC COUNTY
NEW JERSEY

KAMPFE LAKE DAM
NJ 00772

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

REPT. NO: DAEN/NAP-53842/NJ00772-81/07

JULY 1981

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: DAEN/NAP-53842/NJ00772-81/07
2. GOVT ACCESSION NO.: AD-A102 672
3. RECIPIENT'S CATALOG NUMBER:

4. TITLE (and Subtitle): Phase I Inspection Report
National Dam Safety Program
Kampfe Lake Dam, NJ00772
Passaic County, NJ

5. TYPE OF REPORT & PERIOD COVERED: FINAL

6. PERFORMING ORG. REPORT NUMBER:

7. AUTHOR(s): Guinan, Warren, P.E. / Guinan

8. CONTRACT OR GRANT NUMBER(s): DACW61-79-C-0011

9. PERFORMING ORGANIZATION NAME AND ADDRESS:
Anderson-Nichols
150 Casueway St.
Boston, Mass. 02114

National Dam Safety Program. Kampfe Lake Dam (NJ00772), Passaic River Basin, Tributary to Pequannock River, Passaic County, New Jersey. Phase 1 Inspection Report.

11. CONTROLLING OFFICE NAME AND ADDRESS:
NJ Department of Environmental Protection
Division of Water Resources
P.O. Box CN029
Trenton, NJ 08625

12. REPORT DATE: July 1981

13. NUMBER OF PAGES: 50

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office):
U.S. Army Engineer District, Philadelphia
Custom House, 2d & Chestnut Streets
Philadelphia, PA 19106

15. SECURITY CLASS. (of this report): Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)
Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES
Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	National Dam Safety Program	Spillways
Embankments	Kampfe Lake Dam, NJ	Seepage
Visual Inspection	Pequamock River, NJ	Outlet works
Structural Analysis	Passaic River Basin, NJ	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

31 JUL 1981

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Kampfe Lake Dam in Passaic County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Kampfe Lake Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 23 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood). The decision to consider the spillway "inadequate" instead of "seriously inadequate" is based on the determination that dam failure resulting from overtopping would not significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within three months from the date of approval of this report, the owner should engage a qualified professional consultant to perform the following:

(1) Investigate the cause of the seepage adjacent to the right wingwall of the spillway and left drawdown pipe, and the soft, damp areas at the downstream toe of the dam.

(2) Investigate the cause of seepage through the mortared stone masonry spillway.

c. Within six months from the date of approval of this report, the owner should engage a qualified professional consultant to perform the following:

(1) Design the relocation of the gate valves in the 12-inch drawdown pipes to place them at or near the inlets on the upstream side of the dam.

(2) Design the installation of a 16 inch gate valve on the upstream side of the dam to control the low-level outlet.

(3) Design procedures for the removal of trees and brush and their roots from the downstream slope of the dam.

(4) Design or specify repairs for the erosion of the upstream slope of the dam and replacement of the displaced erosion protection on the upstream slope.

d. Within 30 days of the date of approval of this report the following remedial actions should be initiated.

(1) Start a program of periodic monitoring of the seepage and wet area along the toe of the downstream slope.

(2) Replace flange bolts on low level outlet pipe and paint all exposed steel.

e. Within six months from the date of approval of this report, the following remedial actions should be initiated:

(1) Remove trees and brush for a distance of 25 feet downstream from the toe of the dam or to the property line whichever is the lesser.

(2) Backfill animal burrows on the downstream slope of the embankment.

(3) Complete the replacement of the service bridge deck.

(4) Clear trees and brush from the discharge channel and on either side of the spillway discharge channel for a distance of 100 feet from the spillway or to the property line whichever is the lesser distance.

(5) Repair concrete apron at the end of left side drawdown pipe at outlet.

f. The owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

g. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Roe of the Eighth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

KAMPFE LAKE DAM (NJ00772)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 23 April 1981 by Anderson-Nichols & Co., Inc., under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Kampfe Lake Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 23 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood). The decision to consider the spillway "inadequate" instead of "seriously inadequate" is based on the determination that dam failure resulting from overtopping would not significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within three months from the date of approval of this report, the owner should engage a qualified professional consultant to perform the following:

(1) Investigate the cause of the seepage adjacent to the right wingwall of the spillway and left drawdown pipe, and the soft, damp areas at the downstream toe of the dam.

(2) Investigate the cause of seepage through the mortared stone masonry spillway.

c. Within six months from the date of approval of this report, the owner should engage a qualified professional consultant to perform the following:

(1) Design the relocation of the gate valves in the 12-inch drawdown pipes to place them at or near the inlets on the upstream side of the dam.

(2) Design the installation of a 16 inch gate valve on the upstream side of the dam to control the low-level outlet.

(3) Design procedures for the removal of trees and brush and their roots from the downstream slope of the dam.

(4) Design or specify repairs for the erosion of the upstream slope of the dam and replacement of the displaced erosion protection on the upstream slope.

d. Within 30 days of the date of approval of this report the following remedial actions should be initiated.

(1) Start a program of periodic monitoring of the seepage and wet area along the toe of the downstream slope.

(2) Replace flange bolts on low level outlet pipe and paint all exposed steel.

e. Within six months from the date of approval of this report, the following remedial actions should be initiated:

(1) Remove trees and brush for a distance of 25 feet downstream from the toe of the dam or to the property line whichever is the lesser.

(2) Backfill animal burrows on the downstream slope of the embankment.

(3) Complete the replacement of the service bridge deck.

(4) Clear trees and brush from the discharge channel and on either side of the spillway discharge channel for a distance of 100 feet from the spillway or to the property line whichever is the lesser distance.

(5) Repair concrete apron at the end of left side drawdown pipe at outlet.

f. The owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

g. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED: Roger Baldwin

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE: 31 July 81

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Kampfe Lake
Identification No.:	Fed ID No. NJ00772
State Located:	New Jersey
County Located:	Passaic
Stream:	Tributary to Pequannock River
River Basin:	Passaic
Date of Inspection:	April 23, 1981

ASSESSMENT OF GENERAL CONDITIONS

Kampfe Lake Dam is an 85-year old earth filled dam with a stone-masonry and concrete capped ungated spillway that is located near the center of the dam; the structure is in fair overall condition. The dam is small in size and should retain its high hazard classification. Several large trees are growing on the downstream slope in the left and right thirds of the dam. Considerable erosion and sloughing is noticeable near the crest on the downstream slope to the right of the spillway. The area at the downstream toe of the dam is damp and soft and some seepage water was discharging near the toe adjacent to the left drawdown pipe outlet. Two 12-inch cast iron pipes with high-level inlets serving as drawdowns, are located on each end 50 feet from the spillway retreat channel. A 16-inch cast iron pipe provides the low-level outlet located just left of the spillway. All three of these pipes have gate valves located on the downstream slope or toe of the dam. The spillway can pass 22% of the 1/2 PMF test flood without overtopping; therefore it is considered inadequate.

It is recommended that the owner retain the services of a professional engineer, qualified in the design and construction of dams, to accomplish the following in the time periods specified: Starting very soon: Investigate the cause of the seepage adjacent to the right wingwall of the spillway and investigate the cause of seepage through the mortared stone masonry spillway. In the near future: Remove the trees and brush and their roots from the downstream slope of the dam; design or specify repairs for the erosion of the upstream slope of the dam and replacement of displaced erosion protection on the upstream slope; relocate the gate valves in the 12-inch drawdown pipes to place them at or near the inlets on the upstream side of the dam; and install a 16-inch gate valve on the upstream side of the dam to control the low-level outlet; and perform a more detailed hydrologic/hydraulic evaluation of the inadequacy of the spillway and design and implement necessary corrective measures.

It is further recommended that the owner accomplish the following tasks of operation and maintenance procedures: Immediately: Start a program of periodic monitoring of the seepage and wet area along

the toe of the downstream slope; and replace flange bolts on the low-level outlet pipe and paint all exposed steel. Starting soon: develop an emergency action plan which outlines actions taken by the owner to minimize downstream effects of an emergency at the dam. In the near future: develop written operating procedures and develop a periodic maintenance plan to ensure the safety of the dam; establish a formal surveillance program for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of emergency conditions; remove trees and brush for a distance of 25 feet downstream from the toe of the dam or to the property line, whichever is the lesser; and backfill animal burrows on the downstream slope of the embankment; and complete the replacement of the service bridge deck. In the future: clear trees and brush from the discharge channel and on either side of the spillway discharge channel for some distance from the spillway; and repair concrete apron at the end of left side drawdown pipe at outlet.

Warren A. Guinan

Warren A. Guinan, P.E.
Project Manager
New Jersey No. 16848

OVERVIEW PHOTO

KAMPFE LAKE DAM

17 February 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY REPORT

KAMPFE LAKE DAM FED ID NO. NJ00772 NJ NO. 22-180

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
KAMPHE LAKE DAM
FED ID NO. #NJ00772 NJ NO. 22-180

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Kampfe Lake Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 December 1980 under Basic Contract No. FPM-39 and Contract No. A01093 dated 10 October, 1979. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineer District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc.

b. Purpose: The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Kampfe Lake Dam and appurtenances. Conclusions are based upon available data and visual inspection. The results of this study are used to determine any need for emergency measures and conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Kampfe Lake Dam is a 180-foot long rock and earthfill dam with a concrete core. The hydraulic height is 9 feet and the structural height is 10.8 feet. The downstream slope is approximately 2H:1V and the upstream slope is approximately 6H:1V. A 31-foot long broad-crested concrete spillway is located near the center of the dam. The downstream face of the spillway is of stone masonry and has a vertical drop. An undecked bridge spans the spillway. The dam has a low-level 16-inch diameter cast-iron outlet pipe through the base of the dam. Two 12-inch diameter flanged cast-iron draw down pipes with trash racks are located approximately 50 feet on either side of the spillway discharge downstream of the toe.

b. Location. The dam is located in Bloomingdale Borough, Passaic County, New Jersey on a Tributary to the Pequannock River. It is located at north latitude 41° 2.1' and west longitude 74° 20.9' on the Wanque, N.J. Quadrangle. The dam can be reached by taking the N.J. Turnpike to Rt. 46 west in

Ridgefield Park; take Rt. 46 to Rt. 23 north in Paterson; take the Newark-Pompton Turnpike in Riverdale north to the Hamburg-Paterson Turnpike; turn left and proceed for about 2 miles and turn right onto Star Lake Road. Kampfe Lake Dam is about 1.5 miles north on Star Lake Road. A location map is given in Figure 1.

c. Size Classification. Kampfe Lake Dam is classified as being small in size on the basis of storage at the dam crest of 215 acre-feet, which is less than 1000 acre-feet but more than 12.5 acre-feet, and on the basis of its structural height of 12.5 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. Kampfe Lake Dam is immediately upstream of Star Lake Upper Dam. The latter is classified as high hazard because failure would lead to overtopping of Star Lake Lower Dam. A camp ground is located downstream of Star Lake Lower Dam and the loss of more than a few lives is possible. The failure of Kampfe Lake Dam would also overtop both Star Lake upper and lower dams, thus it is also designated as high hazard.

e. Ownership. The dam is owned by the Kampfe Lake Association. Mr. Joseph Gara, Kampfe Lake Association, Inc., Box 10, Bloomingdale, New Jersey 07403 is the caretaker of the dam. He may be reached at the above address.

f. Purpose. Kampfe Lake Dam was built for recreational purposes.

g. Design and Construction History. No information regarding the original plan or design of the dam was available. However, the Kampfe Lake Association estimates that the dam was built between 1895 and 1900. In 1974, two twelve inch pipes and valves were installed for flood control and plans for this work were made available.

h. Normal Operational Procedure. Mr. Joseph Gara, caretaker, is required to check the dam daily. He lives at the lake year round and operates the gates as necessary during storms.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from the Geologic Map of New Jersey (Kummel and Johnson, 1912) and Glacial Drift Map of New Jersey (Salisbury, Kummel, Peet and Whitson, 1902) indicates soils within the immediate site consist of till of glacial origin.

The depth to bedrock at the dam site is unknown. Bedrock was observed in general outcrops on the right abutment during inspection of this dam. The previously mentioned map indicates that bedrock in the area consists of granitoid gneiss of Precambrian age.

1.3 Pertinent Data

a. Drainage Area

0.85 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown

Total ungated spillway capacity at maximum pool elevation - 201

c. Elevation (ft. above NGVD)

Top of dam - 536.8

Design surcharge (1/2 PMF) - 538.3

Recreation pool (at time of inspection) - 535.0

Spillway crest - 535.0

Streambed at centerline of spillway - 526.0

Maximum tailwater (estimated)-530.6

d. Reservoir (feet)

Length of maximum pool - 2700 (estimated)

Spillway crest - 2500

e. Storage (acre-feet)

Spillway crest - 154

Design surcharge (1/2 PMF) - 272

Top of dam - 215

f. Reservoir Surface (acres)

Top of dam - 40 (estimated)

Spillway crest - 25.6

g. Dam

Type - earthfill and rockfill

Length - 180 feet

Height - 10.8 feet (hydraulic)

- 12.5 feet (structural)

Top width - 12 feet

Side slopes - upstream 6H:1V, downstream 2H:1V

Zoning - unknown

Impervious core - concrete

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - Broad-crested concrete drop spillway with a stone masonry vertical downstream face.

Length of weir - 31 feet

Crest elevation - 535' NGVD

Low level outlet - one 16-inch cast-iron pipe downstream invert elevation 526.5' NGVD; upstream invert elevation 528.0' NGVD (estimated)

U/S Channel - Kampfe Lake

D/S Channel - Tributary to Pequannock River

i. Regulating Outlets

Type - Two 12-inch cast-iron, drawdown pipes; upstream invert elevations 532.7 feet NGVD left and 532.9' NGVD right

Length - 70' feet each

Access - Along crest of dam; all valves are located on downstream face and toe of dam.

SECTION 2
ENGINEERING DATA

2.1 Design

No original plans, hydraulic or hydrologic data for Kampfe Lake Dam were found. However, plans and the dam application (No. 634) for the installation of the 12-inch drawdown pipes in 1974 were made available.

2.2 Construction

No data concerning the original construction of Kampfe Lake Dam were disclosed.

2.3 Operation

The gates are regulated by Mr. Joseph Gara, caretaker for the Kampfe Lake Association.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files and contact with a representative of the owner of the dam revealed adequate information. All available information was retrieved.

b. Adequacy. Data obtained from visual observation and the 1974 plans were adequate to complete this Phase 1 Inspection Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. The crest of the dam is partially covered with grass with many areas worn bare because of pedestrian traffic. Some erosion and slumping has occurred on the upstream face which has caused displacement of portions of the riprap cover.

Considerable erosion and sloughing near the crest has occurred on the downstream slope to the right of the spillway. The surface is covered with grass and small brush. Several large trees are growing on the slope to the right of the right (west) drawdown pipe and to the left of the left (east) pipe. The area at the downstream toe of the dam is damp and soft and some seepage water was discharging near the toe adjacent to the left drawdown pipe.

Several small animal burrows were observed on the downstream slope.

b. Appurtenant Structures. The upstream concrete ungated spillway wingwalls show evidence of vertical displacement of up to 1.5 inches as noted on the left side of the spillway. Downstream from the spillway crest, the wingwalls are comprised of mortared masonry stone blocks. The masonry wall has collapsed near the toe on the righthand side. Seepage was noted flowing from between the blocks near the base of the wall. The flow varied in color from clear to slightly cloudy with no evidence of suspended fines. Several large stone blocks were observed on the bottom of the discharge channel near the toe of the vertical downstream face of the spillway which may be the remnant of a spillway apron. The wide crest of the concrete spillway is generally spalled and eroded exposing the coarse aggregate. Numerous leaks were observed in the downstream face of the spillway (mortared, masonry). The twin steel beam set in place for the service bridge are surface rusted.

The low level outlet valve located adjacent to the spillway is located on the downstream end of the outlet pipe. All flange bolts except four (4) are badly corroded. In addition, the valves for the 12-inch drawdown pipes are both located about halfway along the pipes on the downstream face of the dam.

c. Reservoir Area. The watershed above the lake is gently to moderately sloping and wooded. Slopes on the shore of the lake appear stable and some cottages are located near the waterline. No evidence of significant sedimentation was observed.

d. Downstream Channel. The channel meanders downstream from the spillway and erosion has occurred on the right and left sides of the channel for a distance of approximately 200 to 300 feet. Trees are growing within the confines of the channel as well as on the banks. The channel discharges into Upper Star Lake Reservoir.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were revealed. However, the caretaker is required to visit the dam daily. He operates the gate valves as necessary during storms.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were found.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were discovered.

4.4 Warning System

No description of any warning system was found.

4.5 Evaluation of Operational Adequacy

Because of the lack of formal operation and maintenance procedures, the remedial measures described in Section 7.2 should be implemented as described.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Because no data were revealed, an evaluation could not be performed.

b. Experience Data. No experience data were found.

c. Visual Observation. The structural condition of the spillway is described in Section 3. An additional hydraulic observation is that the three gate valves of the drawdown and low-level pipes are located on the downstream side of the dam. Should one or more of these pipes rupture, the water under pressure within the dam could cause a breach or serious erosion of the embankment.

d. Kampfe Lake Dam Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to one-half the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines, for dams classified as high hazard and small in size. The PMF was determined by application of a 24-hour Probable Maximum Storm (PMS) of 27.0 inches to the SCS dimensionless unit hydrograph. Hydrologic computations are given in Appendix 4. The routed half-PMF peak discharge for the subject drainage area is 2279 cfs.

Water will rise to a depth of 1.8 foot above the spillway crest before overtopping the low point on the dam embankment crest. Under this head the spillway capacity is 201 cfs, which is less than the selected SDF.

Flood routing calculations indicate that Kampfe Lake Dam will be overtopped for 5.4 hours to a maximum depth of 1.5 feet under half-PMF conditions. It is estimated that the spillway can pass 22% of the half-PMF without overtopping the dam; thus, the spillway is considered inadequate.

Kampfe Lake Dam is upstream of and tandem to two dams, Star Lake Upper and Lower Dams. Star Lake Upper Dam was designated as high hazard based upon the fact that its failure would lead to the overtopping of Star Lake Lower Dam downstream. This could lead to severe damage of three structures just downstream of Star Lake Lower Dam and possible loss of more than a few lives (downstream area is a camp where the structures are used part of the year). Breach analysis of Kampfe Lake Dam results

in a stage on Star Lake Upper Dam reservoir of 533.1 feet NGVD. This is 0.1 foot higher than the 1/2 PMF stage used as test flood for Star Lake Upper Dam. The routed discharge at Star Lake Lower Dam is greater than that caused by failure of Star Lake Upper Dam. Four or five seasonally occupied cottages around Star Lake Upper Dam would have flooding up to their first floor elevations and the potential for additional property damage. Thus the flooding and damage caused by failure of Kampfe Lake Dam, being even more severe than Star Lake Upper Dam, cause it to also be classified as high hazard.

e. Drawdown Capacity. Assuming that the low-level outlet and drawdown pipes currently in place are in operable condition, it is estimated that the lake can be drained in approximately 8.7 days assuming no significant inflow. This time period is marginal, but adequate, considering the small drainage area for draining the reservoir in an emergency situation.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The soft and damp area at the downstream toe of the dam and seepage at the toe of the right wingwall of the spillway and to the left of the left gated spillway discharge pipe is indicative of seepage through and under the dam which, if not properly controlled, could lead to failure of the dam by piping or sloughing of the downstream slope. Erosion of the upstream slope of the dam which has caused displacement of the riprap at and above the waterline, which, if allowed to continue, could result in eventual breaching of the embankment. Parts of the crest of the dam which are bare of vegetation would be susceptible to erosion if the dam were overtopped. This might, in turn, lead to breaching of the dam.

Trees growing on the donwstream slope and toe may cause seepage and erosion problems if a tree blows over and pulls out its roots, or if a tree dies or is cut and its roots rot. Small erosion sloughs and scarps, which are bare of vegetation, on the downstream slope near the crest are susceptible to erosion by rainfall or by overtopping of the dam; the erosion could, in turn, lead to breaching of the dam.

6.2 Design and Construction Data. No design or construction data pertinent to the structural stability of the dam are available.

6.3 Operating Records. No operating records pertinent to the structural stability of the dam were available.

6.4 Post-Construction Changes. The 1974 Dam Application #634 and accompanying plans were made available for the installation of two 12-inch drawdown pipes.

6.5 Seismic Stability - This dam is in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake, provided static stability conditions are satisfactory and conventional safety margins exist." None of the visual observations made during the inspection are indicative of unstable slopes. However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam, it is not possible to make an engineering evaluation of the stability of the slopes or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Kampfe Lake Dam is estimated to be 85 years old and is in fair condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based entirely on the results of the visual inspection.

c. Urgency. The recommendations made in 7.2.a and 7.2.b should be implemented by the owner as prescribed.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2.a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to failure of the dam.

7.2 Recommendation/Remedial Measures

a. Recommendations

The owner should engage a professional engineer qualified in the design and construction of dams to accomplish the following in the time periods specified.

Starting Very Soon:

(1) Investigate the cause of the seepage adjacent to the right wingwall of the spillway and left drawdown pipe, and the soft, damp areas at the downstream toe of the dam.

(2) Investigate the cause of seepage through the mortared stone masonry spillway.

In the Near Future:

(1) Relocate the gate valves in the 12-inch draw-down pipes to place them at or near the inlets on the upstream side of the dam.

(2) Install a 16-inch gate valve on the upstream side of the dam to control the low-level outlet.

(3) Remove trees and brush and their roots from the downstream slope of the dam.

(4) Design or specifiy repairs for the erosion of the upstream slope of the dam and replacement of the displaced erosion protection on the upstream slope.

(5) Perform a more detailed hydrologic/hydraulic evaluation of the inadequacy of the spillway and design and implement necessary corrective measures.

b. Operating and Maintenance Procedures

Immediately:

(1) Start a progam of periodic monitoring of the seepage and wet area along the toe of the downstream slope.

(2) Replace flange bolts on low level outlet pipe and paint all exposed steel.

Starting Soon:

Develop an emergency action plan which outlines actions taken by the owner to minimize downstream effects of an emergency at the dam.

In the Near Future:

(1) Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

(2) Establish a formal surveillance program for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of emergency conditions.

(3) Remove trees and brush for a distance of 25 feet downstream from the toe of the dam or to the property line whichever is the lesser.

(4) Backfill animal burrows on the downstream slope of the embankment.

(5) Complete the replacement of the service bridge deck.

In the Future:

(1) Clear trees and brush from the discharge channel and on either side of the spillway discharge channel for a distance of 100 feet from the spillway or to the property line whichever is the lesser distance.

(2) Repair concrete apron at end of left side drawdown pipe at outlet.

Anderson-Nichols & Co., Inc.

BOSTON MASSACHUSETTS

U.S. ARMY ENGINEER DIST. PHILADELPHI

CORPS OF ENGINEERS

PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

KAMPFE LAKE DAM LOCATION MAP

SCALE IN MILES

0 4 8

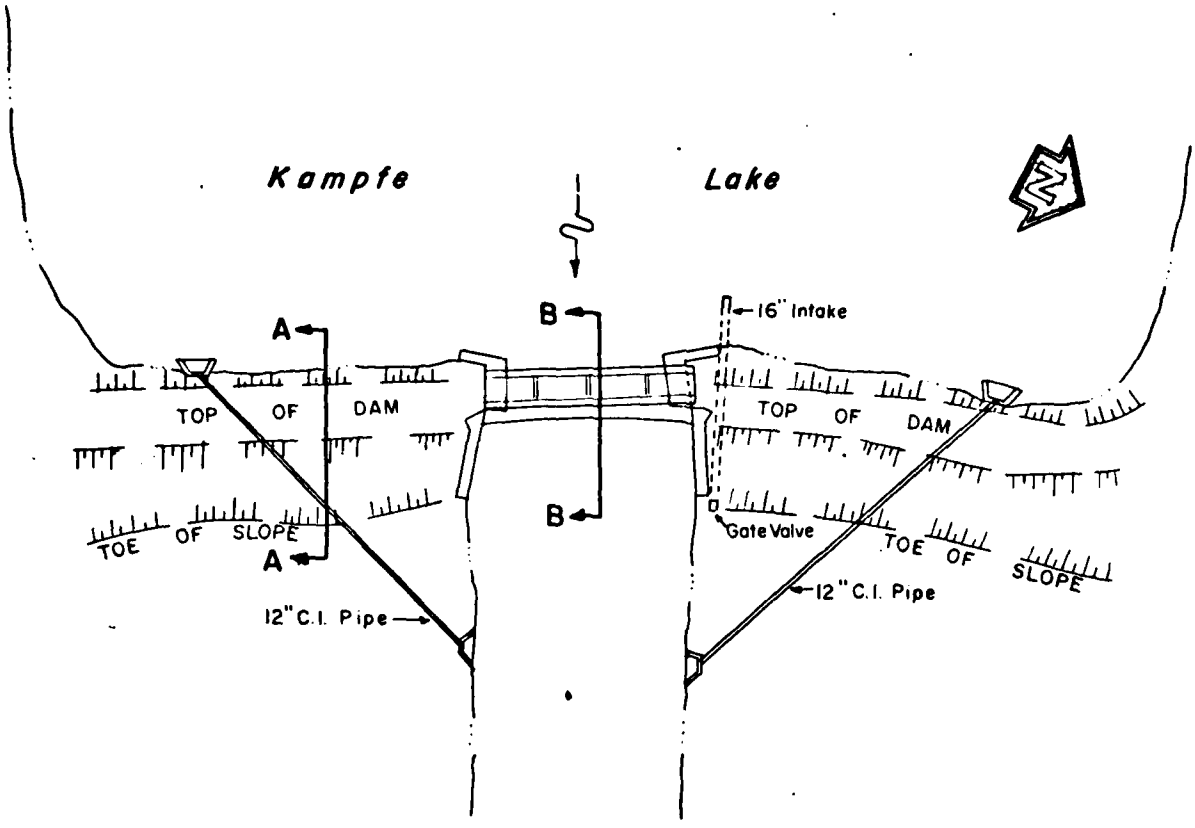
MAP BASED ON STATE OF NEW JERSEY OFFICIAL MAP & GUIDE.

TRIB. TO PEQUANNOCK RIVER NEW JERSEY

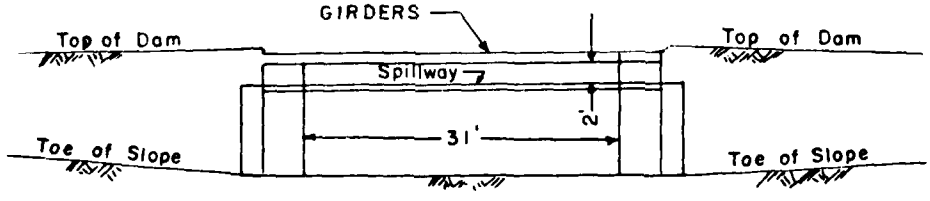
SCALE: 1" = 4 Miles Approx.

DATE: MAY 1981

FIGURE 1



PLAN



SPILLWAY ELEVATION

Anderson-Nichols & Co, Inc BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

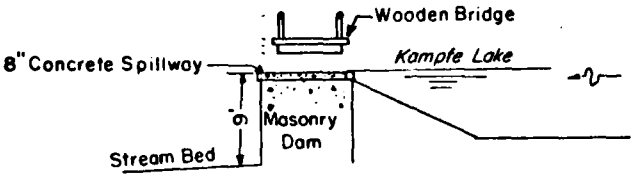
KAMPFE LAKE DAM

TRIB. TO PEQUANNOCK RIVER NEW JERSEY

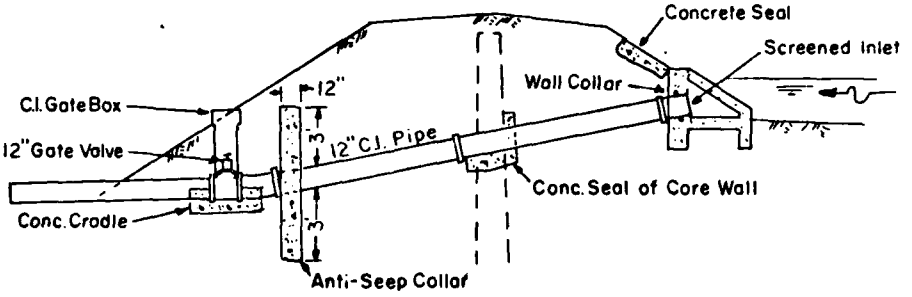
SCALE NOT TO SCALE

DATE MAY 1981 FIGURE 2

SECTION A-A



SECTION B-B



PIPE DETAIL

Anderson-Nichols & Co, Inc. BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
KAMPFE LAKE DAM X-SECTIONS	
TRIB TO PEQUANNOCK RIVER NEW JERSEY	
	SCALE NOT TO SCALE
	DATE MAY 1981 FIGURE 3

APPENDIX I

ENGINEERING AND EXPERIENCE DATA

KAMPFE LAKE DAM

Form 15.5C.-5-59

Dam Application No. 614

Map No. 22-180

State of New Jersey
Division of Water Policy and Supply

REPORT ON DAM APPLICATION

Application of Kampfe Lake

filed November 13, 1959 for approval of plans and for a permit to 2-12' Draw-Down Lines in a dam for the impoundment of Kampfe Lake across an unnamed tributary to Pequannock River in Borough of Bloomingdale

County, New Jersey, has been examined by William F. Rogers, Principal Engineer

PRINCIPAL FEATURES

Purpose of dam	Recreation	Type of dam	Rock and earth fill with concrete core wall
Site inspected		Foundation material	
Location:	22 • 35 • 7• 2 • 5	Maximum height	16 feet
Drainage area	0.85 sq. mi.	Length of dam	300 feet
Elevation of flow line	535.0	Top width of dam	8 feet
Area of lake	32 acres	Downstream slope	1:4
Capacity of lake	52 million gallons	Upstream slope	1:2

Type of spillway Broad Crest Drop

Length of spillway 40

Design flood flow 850 cubic feet per second = 1000 sec. ft. per sq. mi.

Head on spillway for design flood flow 3.61 feet = will overtop embankment.

Freeboard None feet Top of dam 2.8 ft. above spillway elevation.

Maximum spillway capacity (dam owash) = 350 cubic feet per second

= 411 sec. ft. per sq. mi.

Outlet other than spillway None

Drawings filed by T. Aldo Rade & Associates, Inc.

-1-

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
BUREAU OF DAM CONTROL
P.O. BOX 2390
TRENTON, NEW JERSEY 08625 1976 MAR 18 PM 12 15

CONDITION REPORT - DAMS

Dam Application No. 634 Date of Inspection 2/27/76

Name of Dam Hampfe Lake

Owner's Name Hampfe Lake Association, Inc.

Address Hampfe Lake, Box 10, Glenwildale, New Jersey 07403

Comment on the following items in accordance with the instructions enclosed:

A. Earthfill and/or Timber Dams

1. Maintenance
Embankment slopes and the crest of dam adequately maintained

2. Condition
No evidence of seepage or slope deterioration. Lake elevation had been lowered as directed by the New Jersey Department of Environmental Protection

3. Other
Spillway has several separations in masonry joints

B. Masonry and Concrete Dams

1.

2.

3.

4.

5.

C. Channels, Stilling Basins and Surrounding Areas

1. No channel bed erosion or silting

2. No riprap areas

3. Moderate amount of undergrowth in channel

4. No aggradation of stream bed

5. No abnormal subsidence of embankment area

6. No unusual operational behavior

D. Mechanical Equipment

1. Inlet and outlet works and valves functioning. All valves were open.

2. No trash racks

E. Miscellaneous

1. No record of flood waters overtopping the

2.

November 14, 1975

Kampfe Lake Associates, Inc.
P.O. Box 10
Bloomingdale, NJ 07403

Attention: George Monroe, Jr., Secretary

Re: Dam No. 634, Kampfe Lake

Gentlemen:

This is with reference to the condition of Kampfe Lake Dam across an unnamed tributary of the Pompanoosuc River located 3000 feet downstream or southerly of Glenwild Avenue in the Borough of Bloomingdale, Passaic County, New Jersey.

A recent investigation of the dam made by a member of my staff indicates that there are numerous seepage points through the earthen embankment. Since recent construction revealed that a concrete core wall as shown on the drawings in our file, in fact does not exist, the seepage is potentially dangerous. Therefore, you must keep the water elevation of the lake at least one foot below the spillway and have a N.J. Professional Engineer inspect the structure and prepare an Engineering Report in accordance with the enclosed.

The report along with recommended repairs should be submitted to this office within sixty (60) days.

Very truly yours,

Dirk C. Hofman, P.E.
Chief, Bureau of Flood Plain Management

DCH:mks

cc: Borough Engineer
Borough Clerk

ENCLOSURE

October 9, 1975

TO WHOM IT MAY CONCERN:

Pursuant to section 23:5-27 of the Revised Statutes, permission is hereby granted to

George Kamros, Jr., Secretary
Kampfe Lake Assn
P.O. Box 10
Bloomingdale, NJ

to draw off the waters of Kampfe Lake, located at Glenwild Ave., Bloomingdale, NJ, under the supervision of Conservation Officer Arthur Vandelken provided measures are taken to prevent the destruction of any fish.

This permit is issued by the Division of Fish, Game and Shellfisheries for the purpose of salvaging and protecting fish life and for no other purpose.

This permit expires May 15, 1976.

Russell A. Cunningham, Director

RAC:sur
cc Fisheries Lab.
CO Vandelken
Water Resources

Dam No. 634

Kampfe Lake

Inspection Report

October 7, 1975

At about 1030 hours an inspection of the spillway and embankment of the dam was made in company with Mr. Kitchell, Contractor, who installed the two new 12 in. drawdown lines.

The inspection was made at the request of Mr. Kitchell since some people of the Kampfe Lake Association were intimating that the seepage through the dam was due to the disturbance caused by Mr. Kitchell during his construction of the drawdown lines.

Mr. Kitchell noted that at neither end of the dam embankment during his cut through the embankment did he encounter the core wall shown on the approved drawings.

Also, a careful investigation of the upstream face of the embankment under the small riprap, indicated a multitude of small voids and slumps under the riprap. The major portion of the embankment appears to be sand and gravel and it is the opinion of the writer that the poor compaction and material of the original embankment has led to multitudinous seepage paths developing.

Recommendations Possible:

1. That a core wall be installed. (This is not feasible cost wise)
2. That pressure grouting of the entire structure be undertaken. (This also may not be logical conclusion)
3. That a clay blanket and heavy riprap be installed on the upper face of the entire embankment and spillway along with pressure grouting of the spillway section.

W. Hagge

PHONE LOG — Dam 634

10/2/75 Per phone conversation with Mr. Warren Kitchell, Builder & Contractor for installation of pipes in Kample Lake Dam. He stated that he found that there was no core wall in the embankment as indicated on submitted drawings and that there was a leak along one of the pipes installed. He noted that there were various areas of subsidence on the upstream side of the dam and in some parts of the embankment indicating that there may be seepage paths. (Hooper)

10/3/75 At 12:30 hours in call to 201-728-3022 he advised that water level of lake was down about 1 foot to take head off embankment. Call was made to Mr. Joe Zarn from this office at 12:45 hours to 201-838-1666 Sec'y of Kample Lake Assoc. to advise that lake should be kept lowered until positive repairs could be made. Advised Mr. Kitchell that inspection will be made on Tuesday 10/7/75 at 11:00 A.M. (Hooper)

January 31, 1974

Kampfe Lake Association
Kampfe Lake
Bloomingdale, NJ

Attention: George Monroe, Jr.

Re: Kampfe Lake Dam Application No. 634

Gentlemen:

This is with reference to the proposed replacement of an existing 16" drainage structure with twin 12" C.I. pipes, one on each side of the existing spillway of the Kampfe Lake Dam, across an unnamed tributary of the Pequannock River located 3,000 feet downstream or southerly of Glenwood Avenue in the Borough of Bloomingdale, Passaic County, New Jersey.

Preliminary review of the proposed work indicates that some revisions and/or additional information will be necessary as follows:

1. The minimum size C.I. flanged pipe and gate valves should be twenty-four inches.

2. Anti-seep collars should be provided at points about 10 feet downstream from the existing core wall on both proposed pipes. The collars should form water-tight joints with the pipes and extend a minimum of 3 feet from the periphery of the pipes.

3. All elevations on the drawings should be referenced to the NJ USGS datum.

4. The outlets of both pipes should be at a 45 degree angle to the centerline of the channel and be provided with splash aprons and wingwalls.

5. The outlets should be placed so that they are no closer than 25 feet from the centerline of the downstream channel.

6. A sheet of specifications should be provided detailing the appurtenant works and materials to be used.

Upon receipt of revised, signed and sealed drawings in quadruplicate conforming to the cited criteria, your application will receive final review.

Very truly yours,

Dirk C. Hofman, P.E.
Chief, Bureau of Water Control

WFR:lnb

Valves.

Branch Office
770-3043

G. WALDO RUDE
AND
ASSOCIATES, INC.
Engineers—Land Surveyors
30 COLFAX AVENUE
POMPTON LAKES, N. J. 07442
Since 1937
833-1188-9

Charles Hyatt
Charles E. Sweden
Wilbert O. Diegler
William F. Boyle
Harry A. Rue

November 29, 1974

Mr. William F. Rogers
Department of Environmental Protection
P.O. Box 2809
Trenton, N.J. 08625

Re: Kample Lake Associates Inc.
Bloomingdale, N.J.
Dam Application Permit No. 634

Dear Mr. Rogers:

This is to certify that the above project has been constructed in conformance with the drawings and specifications as approved. The Contractor started construction on November 8, 1974, and completed the installation on November 19, 1974. The work was inspected on a daily basis by this office.

Very truly yours,

G. WALDO RUDE & ASSOCIATES, INC.

Harry A. Rue

HAR/rf

cc: Mr. Joe Gara

Dam 634 Attic
(22-130) 1/28/74

Preliminary Calculations
For existing Dam and Spillway

$Q_{100} = 350$, $L = 40$ ft., $C = 3.1$

It should be noted that the maximum head on the spillway will be 2 feet due to guardrails of detail of bridge over spillway.

Maximum Q over existing Spillway
$Q = 3.1 \times 40 \times 2^{3/2}$ (2.83)
$Q = 350$ cfs.

Total freeboard above spillway elevation is 2.3 feet.

The permit will be for work on drainage lines only and at such time that any work is performed on the spillway, detailed drawings and permit will be necessary.

STATE OF NEW JERSEY
Department of Environmental Protection
P.O. Box 2809
Trenton, N.J. 08625

FRESHWATER WETLANDS PERMIT NO. 636

Pursuant to the provisions of NJSA 13:9A of the Revised Statutes, this permit is issued for the project indicated, to the below-named applicant, subject to all the terms and conditions attached hereto.

Apache Lake Associates Inc.
Box 10
Bloomingdale, N.J. 07403

PROJECT: The construction of two-12 inch ductile iron lines and valves, one on each side of the existing spillway of Apache Lake Dam across an unnamed tributary of the Pequannock River located 3,000 feet downstream or southerly of Glenside Avenue in the Borough of Bloomingdale, Passaic County, New Jersey.

Approval
July 10, 1974
Date

For Commissioner, State Department of Environmental Protection
For Director, Division of Water Resources

Attest: Lorette M. Brew

THE APPLICANT(S) AND ALL FOLLOWING HEIRS, ASSIGNS OR SUCCESSORS MUST AGREE TO AND FULFILL THE TERMS AND CONDITIONS OF THIS PERMIT AS SET FORTH AND REFERRED TO IN CHAPTER 439 OF THE DIVISION OF WATER RESOURCES. All property encompassed within this permit must be owned by the applicant and/or proper consents, rights of way or other agreements shall have been obtained for the work outside of property owned by the applicant.

Signature of Applicant: William F. Rogers Certified Mail No. 164206

KAMPFE LAKE
Dam Number 614
Passaic County
Inspection Report

On May 28, 1974 an inspection was made of Kampfe Lake Dam across an unnamed tributary located 3000 feet downstream or southerly of Glenwild Avenue in the Borough of Bloomingdale, Passaic County.

Inspection was made to determine condition of structure in connection with the installation of 2-12 inch drawdown lines and valves, one on each side of the existing spillway.

The condition of the total embankment, spillway and wingwalls is good with no evidence of defects that might need repair.

The embankment is about 240 feet long with a top width of from 10 to 12 feet. Upstream side slope is about 1 on 2 and riprapped with no evidence of erosion from wave action. Downstream side slope is about 1 on 1 with no seepage or leaking evident. The general condition of the upstream and downstream wingwalls and the spillway is good. The downstream wingwalls and spillway are mortared stone with a concrete capped spillway section.

General topography in the area is fairly steep and warrants the use of North Jersey Curve for run-off calculations. The surface area of the lake is about 30 acres with no upstream bodies of water.

William F. Rogers

William F. Rogers
Principal Engineer
Dam Analysis Section

WFR:L:CS

cc: Mr. Dirk C. Hofman

DOWNSTREAM - 1

PEQUANNOCK RIVER

DAMS IN NEW JERSEY—REFERENCE DATA No. 22-52

Name of Owner Salvation Army Inc. Address 122 W.14th.St.N.Y.C.

Name of Dam Star Lake County Morris Location 22.35.7.2.B

CONSTRUCTION: Date About 1900 By whom Star Safety Razor Co.

Stream Nameless branch Tributary to Pequannock River

DRAINAGE BASIN: Area 0.6 sq. mi. Description Hilly,wooded.

Description of valley below dam Steep,uninhabited.2nd.pond immediately below.

DAMAGE FROM FAILURE: Probable None

Previous (date) ———

Purpose Recreation Type Dry rubble wall and earth fill.

Foundation ———

Length 215 ft. Max. height 8.0 ft. Max. width of base Top 10 ft.

Upstream slope 1:2 Downstream slope Vertical Volume Cu. yds.

SPILLWAY: Type Concrete weir Length 49.5 ft.

Depth below top of Wall // 2.5 ft. Capacity 700 c. f. s. per sq. mi.

RESERVOIR: Capacity mill. gals. Area acres. Length ft.

Outlets One 18" concrete pipe with wood gate which cannot be operated.

Remarks

Sources of data Inspection and conf.Major Brinley. J.N.B. Date 7/14/'27

DOWNSTREAM - 2

PEQUANNOCK RIVER

DAMS IN NEW JERSEY—REFERENCE DATA No. 22-53

Name of Owner Salvation Army Inc. Address 122 W.14th.St.,N.Y.C.

Name of Dam Star Lake No.2 County Morris Location 22.35.7.S.2

CONSTRUCTION: Date About 1900 By whom Star Safety Razor Co.

Stream Nameless Branch Tributary to Pequannock River

DRAINAGE BASIN: Area 0.6 sq. mi. Description Hilly,wooded.

Description of valley below dam Steep,uninhabited.

DAMAGE FROM FAILURE: Probable None

Previous (date) ———

Purpose Recreation Type Rubble masonry,gravity section.

Foundation ———

Length 175 ft. Max. height 15 ft. Max. width of base Top 4.5 ft.

Upstream slope Downstream slope Volume Cu. yds.

SPILLWAY: Type Two masonry notches Length 1-30 1-24 & 54 ft.

Depth below top of Wall 0.9 ft. Capacity 108 c. f. s. per sq. mi.

RESERVOIR: Capacity mill. gals. Area acres. Length ft.

Outlets 1-12" Cast iron pipe to water supply.

Remarks

Sources of data Inspection J.N.B. Date 7/14/'27

DOWNSTREAM - 3

PEQUANNOCK RIVER

DAMS IN NEW JERSEY—REFERENCE DATA NO. 22-10

Name of Owner Cold Spring Lake Co., Address Bloomingdale, N. J.

Name of Dam Cold Spring Lake County Passaic Location 22.35.7.d.2

CONSTRUCTION: Date About 1900 By whom John F. Disco (Deceased)

Stream A small stream *Tributary to* Pequannock River

DRAINAGE BASIN: Area 1.48 sq. mi. Description

Description of valley below dam Highway 25u ft. below (box culvert 3C" high 12' wide).

DAMAGE FROM FAILURE: Probable Dam in good shape.

Previous (date) 1903 Water went around right end (now replaced with 60" [illegible]

Purpose Recreation and ice pond Type Rock and concrete wall, earth fill.

Foundation

Length 300 ft. Max. height 16 ft. Max. width of base ft

Upstream slope 2:1 Downstream slope 1 for. 1 f ver Volume Cu. yds

SPILLWAY: Type [illegible] Length 207 ft

Depth below top of Concrete core wall 1.67 ft. Capacity [illegible] c. f. s. per sq. mi.

RESERVOIR: Capacity mill. gals. Area 13 acres. Length ft.

Outlets

Remarks Average depth 9 feet

Sources of data A. C. White (Pequannock Valley Paper Co.) J. L. S., on ground Date 11/8/23

APPENDIX 2

CHECK LIST

VISUAL INSPECTION

KAMPFE LAKE DAM

Check List
Visual Inspection
Phase 1

Name Dam Kampfe Lake Dam (NJ00772) County Passaic State NJ Coordinators NJDEP

Date(s) Inspection 2/17/81, 4/23/81 Weather Rain, Warm, ptly cloudy Temperature 50°, 55°

Pool Elevation at Time of Inspection 533', 535' NGVD Tailwater at Time of Inspection None, 527' NGVD

Inspection Personnel:

Stuart	Gilman
Deane	Guinan
Plaud	Murdock

Stuart, Gilman Recorder

Mr. Joseph Gara, caretaker, was present at both inspections

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	- Wide crest is generally spalled and eroded exposing the coarse aggregate, Max. depth 1/ 2-in±. - Downstream face (mortared masonry) is leaking in numerous places. - Recently repaired concrete in fair shape - Spillway abutments recently repointed.	Repair eroded concrete
APPROACH CHANNEL	Poured concrete blocks adjacent to u/s wing walls have settled and moved away from the wing walls. Clear - unobstructed	
DISCHARGE CHANNEL	Clear, rocky channel 6-in - 8-in trees 100 ft d/s	
BRIDGE AND PIERS OVER SPILLWAY	- Recently poured concrete abutments - good condition. - Twin "I" beams for bridge deck are rusted thru paint, bracing angles are surface rusted. - No deck - Cantilevered walkway on left of spillway is in good condition - Wood deck is surface weathered.	

OUTLET WORKS

(Two 12-in drawdown pipes)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not visible. New outlet pipes and concrete wingwalls.	
INTAKE STRUCTURE	Intake pipes, wingwalls and trash racks, new and in good condition.	
OUTLET PIPE	New - good condition	
OUTLET CHANNEL	Rocky, brushy channel. Concrete aprons, surface eroded 1/2-in deep. Left side apron is crumbling. Left side outlets approximately 30-ft d/s toe. Right side outlets approximately 50-ft d/s toe.	Repair concrete apron.
EMERGENCY GATE	Not applicable	

OUTLET WORKS
(16-in pipe)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not applicable	
INTAKE STRUCTURE	Not visible	
OUTLET PIPE	16-in valve on d/s end. All flange bolts connecting valve are badly corroded except for 4 bolts. Valve leaking slightly. Pipe and valve rusting.	Replace badly corroded bolts. Clean and paint valve. Relocate valve to upstream side.
OUTLET CHANNEL	See "UNGATED SPILLWAY DISCHARGE CHANNEL"	
EMERGENCY GATE	Not applicable	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Clear, rocky channel 6-in - 8-in trees.	
SLOPES	Gentle slopes, watershed steeply sloping.	
APPROXIMATE NO. OF HOMES AND POPULATION	3 camp buildings are downstream of Star Lake - population varies with season	High Hazard

Note: Caretaker required to check dam daily by Owners. Lives at the lake year-round. Operates gate valves as necessary during storms.

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	On the shore of the lake, slopes appear stable and are gently to moderately sloping. 17 private homes.	
SEDIMENTATION	No evidence of significant sedimentation was observed.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None found. Information available from plan #634 done for the installation of 2 - 12-in. drawdown lines. The plan is available from NJDEP files, filed 16 August 1973 for NJ dam #22-180, or Fed. ID No. NJ00772.
REGIONAL VICINITY MAP	Prepared for this report
CONSTRUCTION HISTORY	None found
TYPICAL SECTIONS OF DAM	Available from plan #634 in NJDEP files. See PLAN OF DAM above. Used for typical section figure in report.
HYDROLOGIC/HYDRAULIC DATA	None found
OUTLETS - PLAN	Plan #634 available in NJDEP files. See PLAN OF DAM above.
- DETAILS	Same as above
- CONSTRAINTS	None found
- DISCHARGE RATINGS	None found
RAINFALL/RESERVOIR RECORDS	None found

ITEM	REMARKS
DESIGN REPORTS	None found
GEOLOGY REPORTS	None found
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None found
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None found
POST-CONSTRUCTION SURVEYS OF DAM	See PLAN OF DAM on previous page
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Two 12-inch drawdown lines were constructed through the existing dam in 1974. See PLAN OF DAM on page 2-7.
HIGH POOL RECORDS	None
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Some information available in NJDEP files. Legible sheets are included in Appendix 1, ENGINEERING and EXPERIENCE DATA.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Unknown
MAINTENANCE OPERATION RECORDS	None

ITEMS		REMARKS
SPILLWAY PLAN		Available on 1974 plan of installation of 2 12-inch drawdown lines. See PLAN OF DAM on page 2-7.
	SECTIONS	Same as above
	DETAILS	None available
OPERATING EQUIPMENT PLANS & DETAILS		Some information in 1974 plan mentioned above.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.85 square miles, steep slope, woods, homes

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 535' NGVD (154 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) Not applicable

ELEVATION MAXIMUM TEST FLOOD POOL: 538.3' NGVD (1/2 PMF)

ELEVATION TOP DAM: 536.8' NGVD

SPILLWAY CREST: Free overflow concrete spillway

a. Elevation 535' NGVD

b. Type Broad crested concrete spillway with vertical drop

c. Width 7 feet

d. Length 31 feet

e. Location Spillover Center of dam

f. Number and Type of Gates None

OUTLET WORKS: Two high-level draw-down pipes (with trash racks); one low-level outlet pipe

a. Type Two 12-inch cast-iron and one 16-inch cast-iron flanged pipes.

b. Location High level pipes are 50 feet on either side of spillway; low-level outlet is about 10 feet left (east of spillway

c. Entrance Inverts High-level: Left 532.7' NGVD; Right 532.9' NGVD low-level 528' NGVD (estimated)

d. Exit Inverts High-level: Left 527.0' NGVD; Right 527.4' NGVD low-level 526.5' NGVD

HYDROMETEOROLOGICAL GAGES: None

MAXIMUM NON-DAMAGING DISCHARGE: 201 cfs

APPENDIX 3

PHOTOGRAPHS

KAMPFE LAKE DAM

April 23, 1981

View looking u/s from below dam at overflow spillway

April 23, 1981

View looking west over spillway and bridge girders

February 17, 1981

Upstream face looking into high level outlet intake and bar screen for 12-in pipe on right (west) side of dam.

April 23, 1981

Head wall and 12-in CIP on west (right) side looking up along cover over pipe to dam crest. Valve box located on d/s side just below crest.

April 23, 1981

View of cracked concrete anchorage for cantilevered walk used to raise and lower screen over blow-off pipe inlet.

April 23, 1981

View of 16-in pipe and valve (blow-off) near d/s toe of dam.

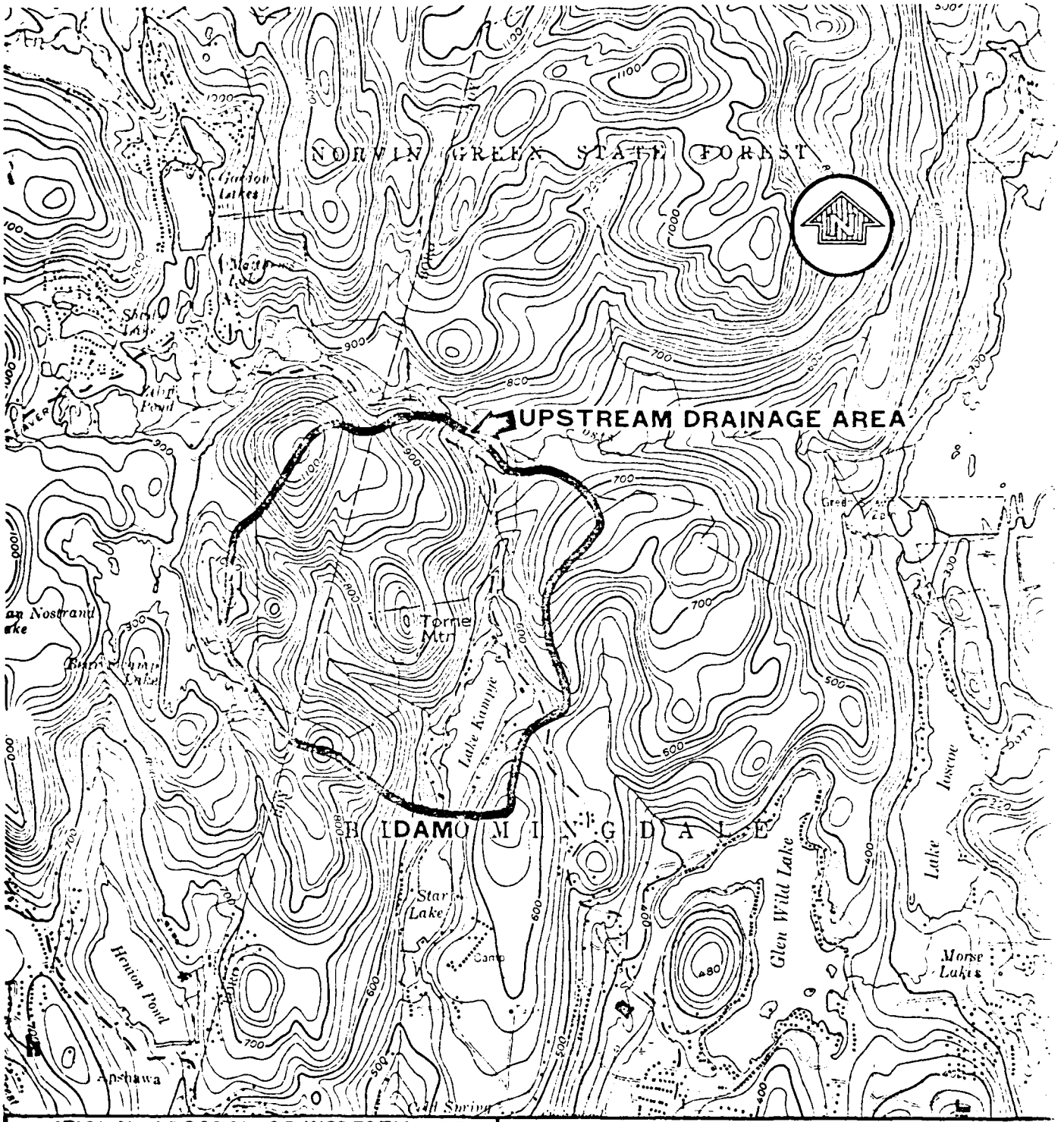
April 23, 1981

View of downstream channel

APPENDIX 4

HYDROLOGIC COMPUTATIONS

KAMPFE LAKE DAM



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE KAMPFE DAM
BLOOMINGDALE BORO, NEW JERSEY

REGIONAL VICINITY MAP

MAY 1981

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

Anderson-Nichols & Company, Inc. BOSTON, MA.

SCALE IN MILES

0 1/2 1

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEET WANAQUE, N.J. 1954, REVISED 1971.

Anderson-Nichols & Company, Inc. Subject Kampfe Lake Dam Sheet No. 1 of 14
Date 7/20/81
Computed CRP
Checked

JOB NO.

Time of Concentration

1. Texas Highway Method

overland

reach length 2200'

slope $\frac{1130 - 740}{2200} = .17 = 17\%$

ave vel. 3.5 ft/sec

channel

reach length 3000'

slope $\frac{740 - 520}{3000} = .07 = 7\%$

ave vel. 5 ft./sec

$\frac{2200 \text{ ft}}{3.5 \text{ ft/sec}} + \frac{3000 \text{ ft}}{5 \text{ ft/sec}} = 20 \text{ min.}$

2. Soil & Water Conservation

$L = 0.6\, t_c \qquad L = \frac{\ell^{0.8}\,(S+1)^{1.67}}{9000\, y^{0.5}}$

$S = \frac{1000}{CN} - 10$

Take CN = 70 for woods

$S = \frac{1000}{70} - 10 = 4.3$

$\ell = 2200 + 3000 = 5200$

$y = \frac{1130 - 520}{5200} = .12 = 12\%$

$L = \frac{(5200)^{0.8}\,(4.3+1)^{1.67}}{9000\,(.12)^{1/2}} = 0.49 \text{ hrs.}$

$T_c = \frac{0.49}{0.6} = .81 \text{ hrs} = 49 \text{ min}$

3. SCS TR = 55

overland

$\ell = 2200$ slope = 17%

from fig. 3-1 page 3-2 $V = 1.0$ ft/sec

$$T_c = \frac{2200 \text{ ft}}{1 \text{ ft/sec}} = 37 \text{ min}$$

channel

$\ell = 3000$ $h = 220$

$s = .07$ $n = .04$ $V = \frac{1.49}{n} R^{2/3} S^{1/2}$

(Assume a 10' x 1' rectangular channel to calculate R)

$$R = \frac{A}{wp} = \frac{10}{20+(10)} = 0.83 \text{ ft}^2$$

$$V = \frac{1.49}{.04} (.83)^{2/3} (.07)^{1/2} = 8.7 \text{ ft./sec}$$

$$T_c = \frac{3000 \text{ ft}}{8.7 \text{ ft/sec}} = 5.7 \text{ min}$$

Total T_c = 37 + 5.7 **40.7 min**

4. Kirby Method

overland

$$T_c = 0.83 \left(\frac{N\ell}{\sqrt{s}}\right)^{0.467}$$

$N = 0.6$ $s = .17$ $\ell = 2200$

$$T_c = .83 \left[\frac{(0.6)(2200)}{\sqrt{17}}\right]^{0.467} = 36 \text{ min.}$$

for channel use Manning's, as Method 3

$V = 8.7$ ft / sec $T_c = \frac{3000 \text{ ft}}{8.7 \text{ ft/sec}} = 5.7$ min.

Total $t_c = 36 + 5.7 = \underline{41.7 \text{ min.}}$

Average T_c

$$\frac{20 + 49 + 42.7 + 41.7}{4} = 38.4 \text{ min}$$

$T_L = 0.6 \times 38.4 = 23$ min $= \boxed{.38 \text{ hrs}}$

SQUARES 1/4 IN. SCALE 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

STAGE - STORAGE DETERMINATION

*Average Depth of Lake is 6'

Elevation ft	Surface Area Acres	Av S.A Acres	Incremental Storage	Cumulative Storage
		25.6	153.6	
535	25.6			153.6
		35.2	176 C	
540	44.8			329.6
		57.6	1152.0	
560	70.4			1481.6

Input from HEC-I (from curve)

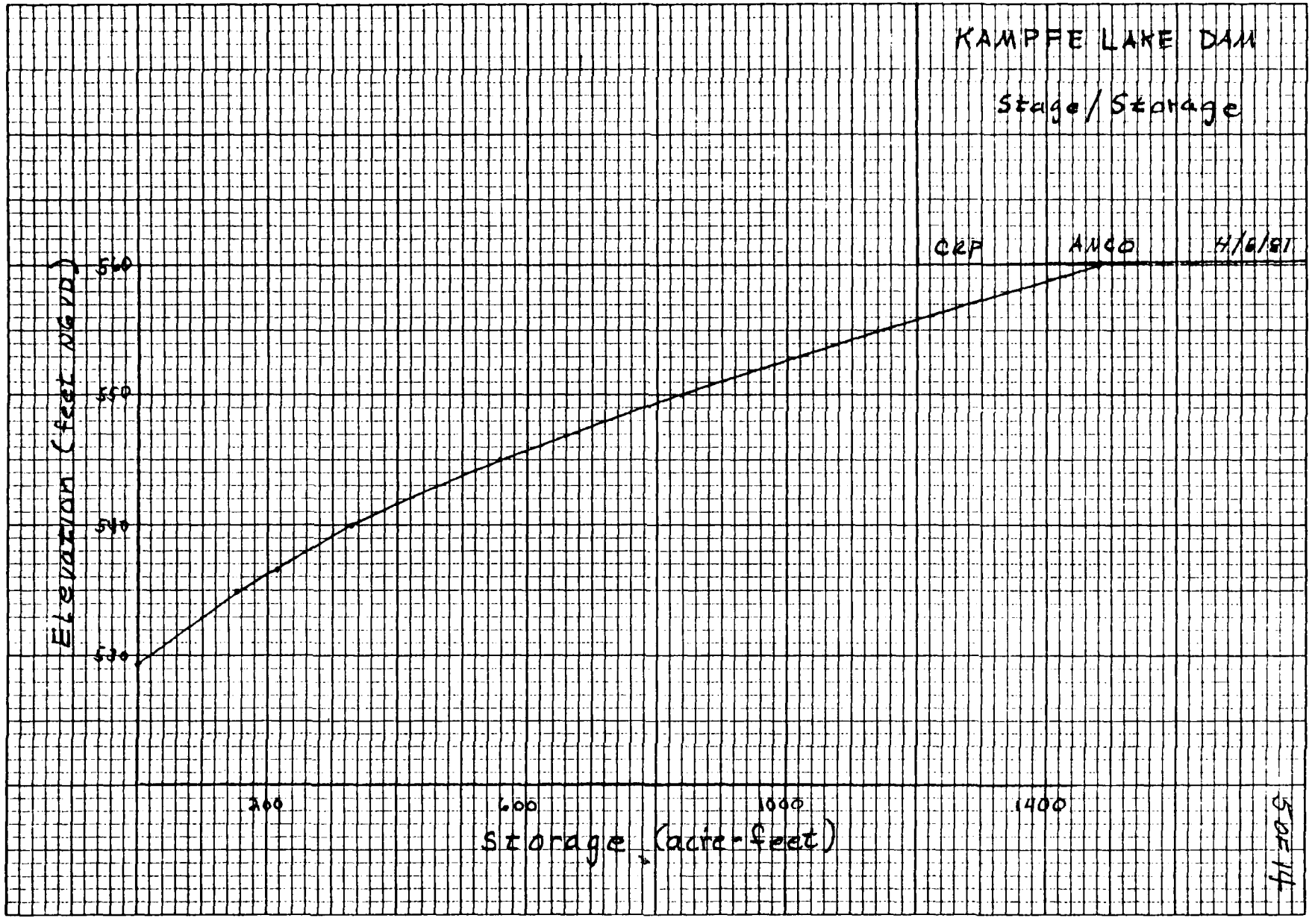
Stage	Storage
529.5	0
535	153.6
536.8	215.0
540	329.6
545	560.0
550	840.0
555	1150.0
560	1482.0

* Dam repair application gives capacity at spillway of 52 million gallons; surface area = ~26 acres

$$3.259 \times 10^5 \times 1 \text{ gal} = 1 \text{ acre} \cdot \text{ft}$$

$$\frac{52 \times 10^6}{.3259 \times 10^6} = 159.6 \text{ acre-ft}$$

$$\frac{159.6 \text{ acre-ft}}{26 \text{ acres}} = \sim 6'$$



Anderson-Nichols & Company, Inc.

Subject Kampfe Lake Dam

Sheet No. 6 of 14
Date 4/6/81
Computed CRF
Checked KRS

JOB NO.

DEVELOPMENT OF RATING CURVE $Q = C L H^{3/2}$

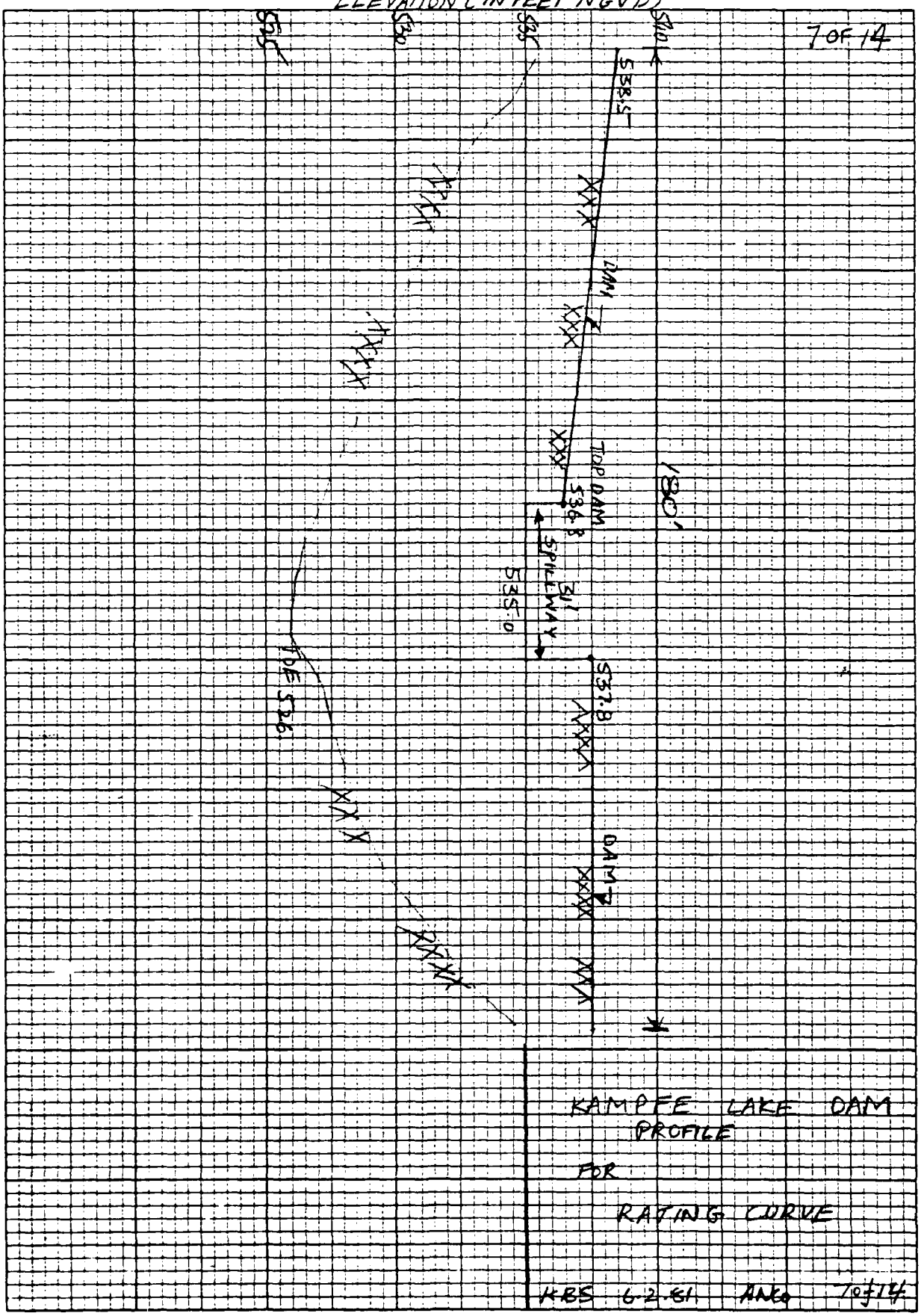
① Spillway Curve

$C = 2.68$ $L = 31'$ width $= 7'$

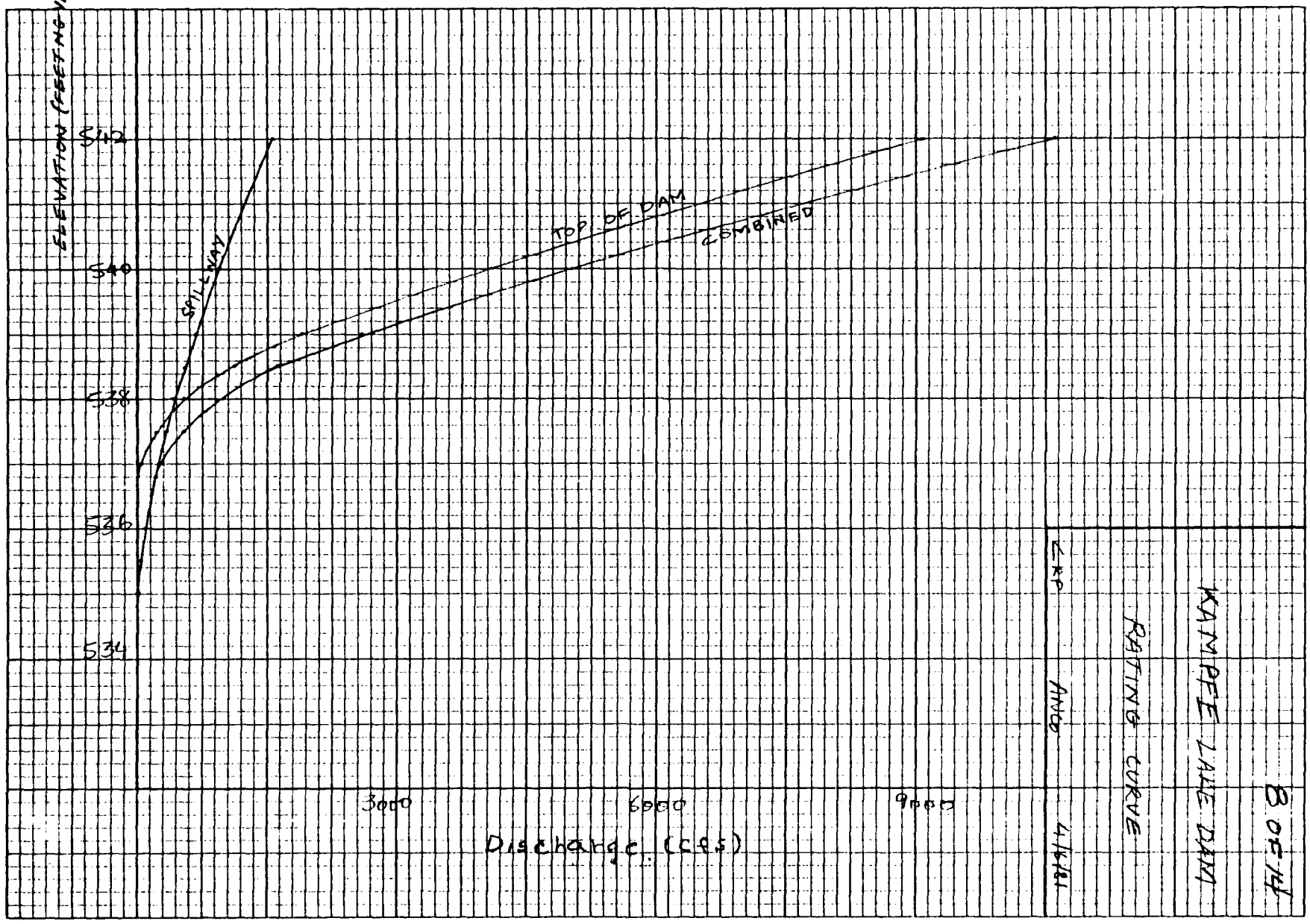
② Top of Dam Curve

$C = 2.64$ $L = 180'$ width $= 10'-12'$
(including spillway)

	Elevation	Spillway head	Spillway Q-cfs	Top of Dam head	Top of Dam length	Top of Dam cfs	Combined Q cfs
SPILLWAY	535.0	0	0				0
	535.5	0.5	29.1				29.1
	536.0	1.0	83.1				83.1
	536.5	1.5	152.7				152.7
TOP DAM	536.8	1.8	200.7	0	100	0	200.7
	537.0	2.0	235.0	0.2	100	23.6	258.6
	537.5	2.5	328.5	0.7	130	201.0	529.5
	538.0	3.0	431.8	1.2	160	555.3	987.1
	538.5	3.5	544.1	1.7	185	1082.6	1626.7
	539.0	4.0	664.8	2.2	220	1895.2	2560.0
	540.0	5.0	929.1	3.2	270	4080.3	5009.4
	542.0	7.0	1540.0	5.2	290	9078.3	10618.3



46 0782



KAMPFE LAKE DAM

RATING CURVE

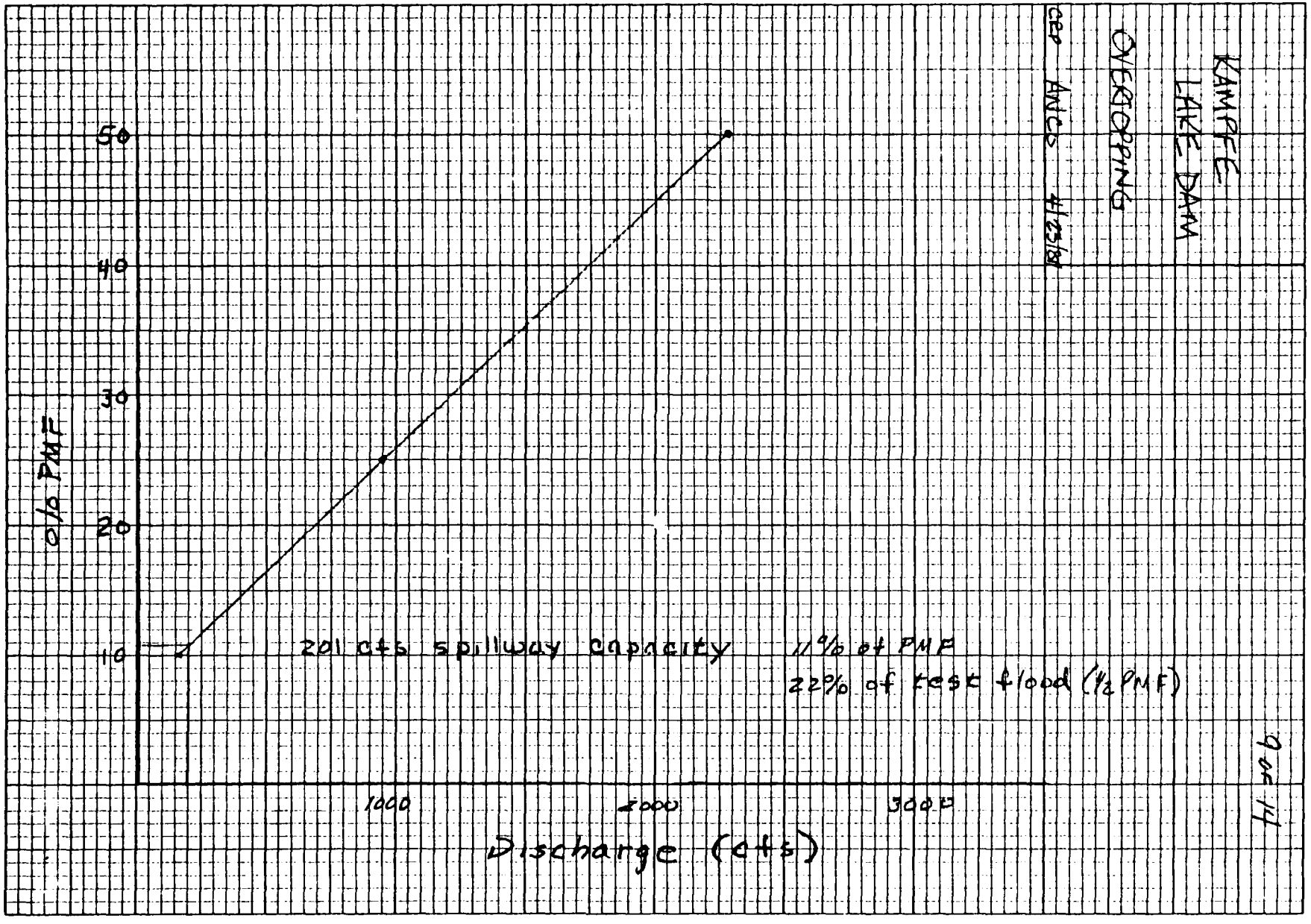
EKP

ANCO

4/16/81

B OF 4

KAMPFF
LAKE DAM
OVERTOPPING
Dep Anlys #1 (2510)



9 of 14

Downstream Hazard

Star Lake Upper Dam (NJ00221) was designated as High Hazard in the Phase 1 Inspection Report of February 1980, because failure of this dam would overtop Star Lake Lower Dam.

Downstream of Star Lake Lower Dam is a camp ground with buildings that are inhabited on a seasonal basis, and therefore loss of more than a few lives is possible.

Failure of Kampfe Lake Dam just before overtopping (at 536.8ft NGVD) resulted in a maximum outflow of 2886 cfs at Star Lake Upper Dam.

Because the storage behind Star Lake Lower Dam is minimal, this discharge (2886 cfs) was assumed to be about the same at the lower dam.

Referring to the stage/discharge calculations from the Star Lake Upper Phase 1 Report, this discharge would cause a stage about 2 feet above the crest of Star Lake Lower Dam and the discharge would exceed that caused by failure of Star Lake Upper Dam.

Therefore, Kampfe Lake Dam should also be designated as High Hazard.

SQUARES 1/4 IN. SCALE

Determination of "C" for high level and low level outlets

Each 12-in ϕ high level pipe:

D = Diameter = 12-in

n = .013 cast iron (King + Brater 6-15)

A_p = area of pipe opening = 0.79 ft²

L_p = length of pipe

K_f = friction loss through pipe

$$K_f = \frac{5087\, n^2}{D^{4/3}} = \frac{5087\,(.013)^2}{12^{4/3}} = \frac{0.86}{27.5} = .031$$

K_L = entrance loss to pipe = 0.8 (K+B 6-19)

$$C_p = A_p \sqrt{\frac{2g}{1+K_L+K_f L_p}} = 0.79 \sqrt{\frac{64.4}{1+0.8+.031(70)}} = 3.2$$

$$C = C_p / A_p / \sqrt{2g} = 0.5$$

16-in ϕ low level pipe

D = 16 in n = .013 A_p = 1.40 ft²

L_p = 35

$$K_f = \frac{5087\,(.013)^2}{(16)^{4/3}} = .021$$

K_L = 0.8

$$C_p = 1.4 \sqrt{\frac{29}{1+.8+.021(35)}} = 7.1$$

$$C = 7.1 / 1.4 / 8 = 0.63$$

Drawdown Calculations for Two High Level outlets and One Low Level outlet

Assume (1) no significant outflow
(2) Two 12-in Ø high level pipes
entrance inverts 532.7 & 532.9
take h above mid-pt.
532.8 (ave) + 6" = 533.3
C_p = 3.2 for each
(3) one 16-in Ø low level pipe
entrance invert 528.0
take h above mid-pt.
528 + 8" = 528.7 C_p = 7.1
(4) $Q_p = C_p H^{1/2}$
(5) Acft/day = 1.9835 × Q ave
(6) Days = Δ storage / Acre ft/day

ELEV	Storage (Acft)	Δ S	H (ft) 12"	H (ft) 16"	Q 12"	Q 16"	Ave Q	Acft/day	days
535	154		1.7	6.3	8.3	17.8			
		29					23.9	47.4	0.61
534	125		0.7	5.3	5.4	16.3			
		25					18.5	36.7	0.68
533.3	100		0	4.6	0	15.2			
		23					14.1	28.0	0.82
532	77		0	3.3	0	12.9			
		40					10.5	20.8	1.92
530	37		0	1.3	0	8.1			
		37					4.0	7.9	4.68
528.7	0		0	0	0	0			

8.7 days

Anderson-Nichols & Company, Inc.

JOB NO. 3409-09

Subject STAR LAKE UPPER DAM

22-E

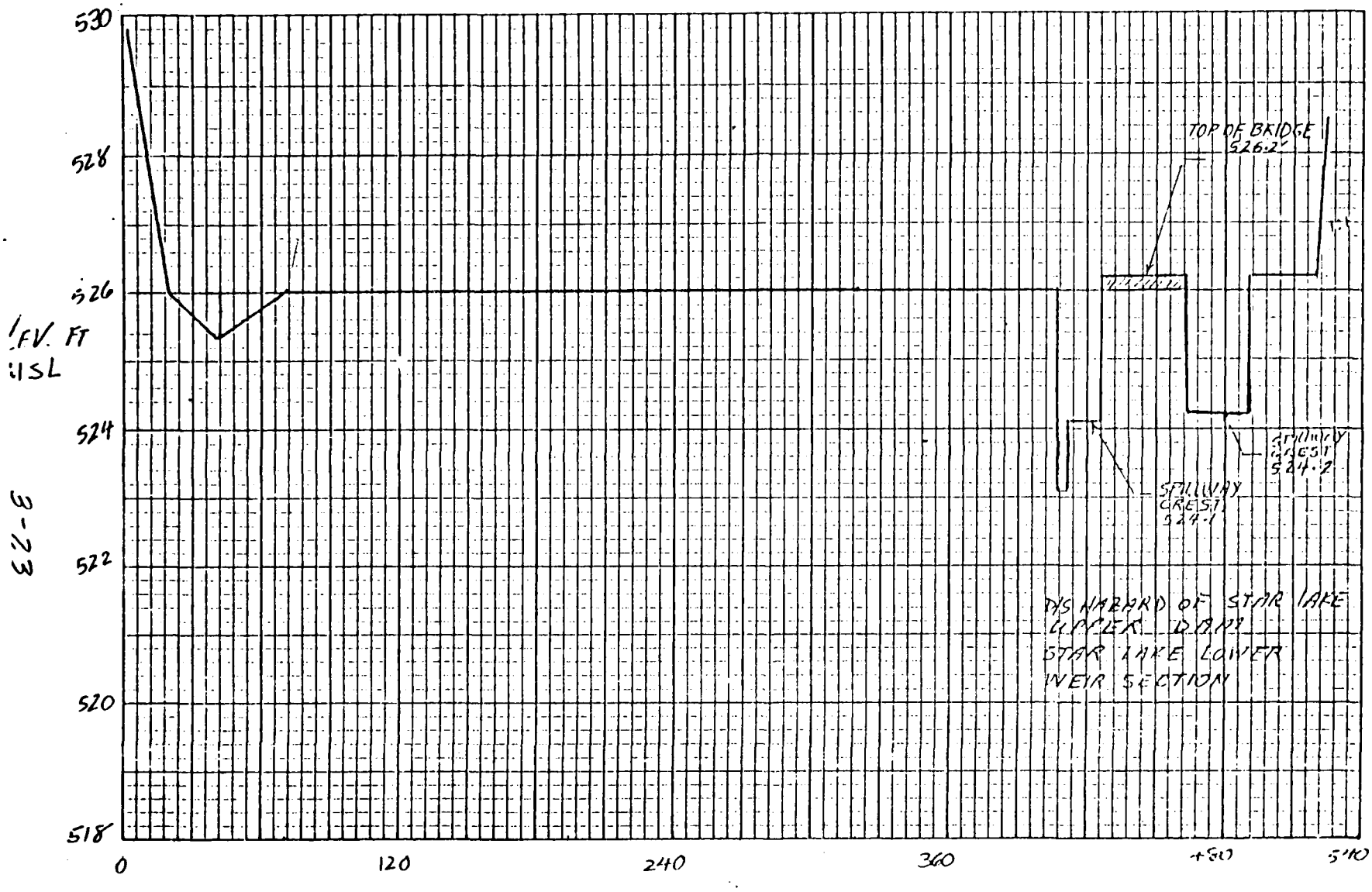
Sheet No. ____ of ____
Date 12-4-79
Computed FCHA
Checked FDD

ELEV. (FT)	LEFT SPILLWAY L = 20 FT HEAD (FT)	LEFT SPILLWAY Q (CFS)	RIGHT SPILLWAY L = 26 FT HEAD (FT)	RIGHT SPILLWAY Q (CFS)	TOP OF DAM HEAD (FT)	TOP OF DAM LENGTH (FT)	TOP OF DAM Q (CFS)	COMBINED Q (CFS)
524.1	0	0	0	0				0
524.2	0.1	2	0	0				2
525.3	1.2	76	1.1	87	0		0	163
526	1.9	152	1.8	182	0.7	50	27 ~~36~~	361 ~~370~~
526.2	2.1	140	2	169	0.8 ~~0.9~~	450 ~~380~~	104 ~~165~~	413 ~~415~~
527	2.9	227	2.8	280	1.5 ~~1.6~~	4.50	1,170 ~~1562~~	1677 ~~2070~~
527.5	3.4	288	3.3	358	2.0	450	2449	2795

a) UP TO THE LOW CHORD OF THE BRIDGE USE WEIR EQUATION (C = 2.9)
b) FROM LOW CHORD UP USE WEIR EQUATION WITH (C = 2.3) TO ACCOUNT FOR LOSSES DUE TO THE BRIDGE
c) C = 2.6 FOR DIRT ROAD

* "C" VALUES WERE TAKEN FROM BRATER & KING "HANDBOOK OF HYDRAULICS"

13014



FV. FT
MSL

E-23

14 OF 14

APPENDIX 5

HEC-1 OUTPUT

KAMPFE LAKE DAM

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1          ID    KANPEE LAKE DAM                 OVERTOPPING  ANALYSIS  ##KK#SOMERVILLE A-NASCO INC##
   2          ID    NEW JERSEY DAM NO.772  PASSAIC COUNTY  BOROUGH OF BLOOMINGDALE
   3          ID    0.1,0.25,0.5 MULTIPLES OF PMF FROM 24-HOUR PMP
   4          IT       5         0         0       300
   5          IO       2         1
   6          JP       1         0
   7          JR    FLOW      0.1      0.25      0.5

   8          KK      A1 KANPEE LAKE
   9          KM     SCS UNIT GRAPH    COMPUTATION-EXPONENTIAL LOSS RATE
  10          BA    0.65       0
  11          UF     2.5       2.5       1
  12          PM     22.                            NO       113       123       132
  13          LU       1        .1       5
  14          UD     .38

  15          KK      A2   ROUTE INFLOW HYDROGRAPH THROUGH KANPEE LAKE
  16          RS       1      STOR       154
  17          SV       0       154       215       260       330       420       515
  18          SE   526.5       535     536.8       538       540       542       544
  19          SQ       0        83       201       987      2560      5009
  20          SE     535       536     536.8       538       539       540
  21          SS     535        31      2.66       1.5
  22          ST   536.8       149      2.64       1.5
  23          ZZ
```

```
                                                    (VERSION 4.1)

                                                    RUN DATE 15MAR94
                                                    TIME 15.33.58

                                                    U.S. ARMY CORPS OF ENGINEERS
                                                    THE HYDROLOGIC ENGINEERING CENTER
                                                    609 SECOND STREET
                                                    DAVIS, CALIFORNIA 95616
                                                    (916) 440-3265 OR (FTS) 448-3265

                    KAMPFE LAKE DAM                 OVERTOPPING ANALYSIS  ##K&SOMERVILLE A-NGCO INC##
                    NEW JERSEY DAM NO.772  PASSAIC COUNTY  BOROUGH OF BLOOMINGDALE
                    0.1.0.25.0.5 MULTIPLES OF PMF FROM 24-HOUR PMP

     IO             OUTPUT CONTROL VARIABLES
                         IPRNT         2  PRINT CONTROL
                         IPLOT         1  PLOT CONTROL
                         QSCAL        0.  HYDROGRAPH PLOT SCALE
                          QMSG       YES  PRINT DIAGNOSTIC MESSAGES

     IT             HYDROGRAPH TIME DATA
                         NMIN          5  MINUTES IN COMPUTATION INTERVAL
                        IDATE    1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                        NDDATE   2    0  ENDING DATE
                        NDTIME        0055  ENDING TIME

                      COMPUTATION INTERVAL     0.08 HOURS
                         TOTAL TIME BASE    24.92 HOURS

                ENGLISH UNITS
                     DRAINAGE AREA          SQUARE MILES
                     PRECIPITATION DEPTH    INCHES
                     LENGTH, ELEVATION      FEET
                     FLOW                   CUBIC FEET PER SECOND
                     STORAGE VOLUME         ACRE-FEET
                     SURFACE AREA           ACRES
                     TEMPERATURE            DEGREES FAHRENHEIT

     JP             MULTI-PLAN OPTION
                         NPLAN         1  NUMBER OF PLANS

     JR             MULTI-RATIO OPTION
                        RATIOS OF RUNOFF
                       0.10      0.25      0.50

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                    ***************
                    *             *
     6 KK           *      A1     *      KAMPFE LAKE
                    *             *
                    ***************
                                   SCS UNIT GRAPH   COMPUTATION-EXPONENTIAL LOSS RATE

                SUBBASIN RUNOFF DATA

    10 BA           SUBBASIN CHARACTERISTICS
                         TAREA        0.85  SUBBASIN AREA

    11 BF           BASE FLOW CHARACTERISTICS
                         STRTQ        2.50  INITIAL FLOW
                         QRCSN        2.50  BEGIN BASE FLOW RECESSION
                         RTIOR     1.00000  RECESSION CONSTANT
```

PRECIPITATION DATA

12 PM — PROBABLE MAXIMUM STORM

PMS	22.00	INDEX PRECIPITATION
TRSPC	0.80	TRANSPOSITION COEFFICIENT
TRSDA	0.85	TRANSPOSITION AREA
SWD	NO	USE SWD DISTRIBUTION

PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME

6-HR	12-HR	24-HR	48-HR	72-HR	96-HR
113.0	123.0	132.0	0.0	0.0	0.0

13 LU — UNIFORM LOSS RATE

STRTL	1.00	INITIAL LOSS
CNSTL	0.10	UNIFORM LOSS RATE
RTIMP	5.00	PERCENT IMPERVIOUS AREA

14 UD — SCS DIMENSIONLESS UNITGRAPH

TLAG	0.30	LAG

***

UNIT HYDROGRAPH
25 END-OF-PERIOD ORDINATES

9.	297.	630.	896.	973.	915.	773.	568.	395.	284.
214.	152.	110.	80.	57.	42.	30.	22.	16.	12.
9.	7.	4.	3.	1.					

HYDROGRAPH AT STATION A1

DA	MO	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
		0000	1	0.0	0.0	0.0	3.	1		1230	151	0.17	0.01	0.16	649.
		0005	2	0.01	0.01	0.00	3.	1		1235	152	0.17	0.01	0.16	758.
1		0010	3	0.01	0.01	0.00	3.	1		1240	153	0.17	0.01	0.16	839.
		0015	4	0.01	0.01	0.00	3.	1		1245	154	0.17	0.01	0.16	894.
		0020	5	0.01	0.01	0.00	3.	1		1250	155	0.17	0.01	0.16	935.
		0025	6	0.01	0.01	0.00	4.	1		1255	156	0.17	0.01	0.16	964.
1		0030	7	0.01	0.01	0.00	4.	1		1300	157	0.17	0.01	0.16	986.
1		0035	8	0.01	0.01	0.00	5.	1		1305	158	0.20	0.01	0.19	1005.
1		0040	9	0.01	0.01	0.00	5.	1		1310	159	0.20	0.01	0.19	1026.
1		0045	10	0.01	0.01	0.00	5.	1		1315	160	0.20	0.01	0.19	1055.
1		0050	11	0.01	0.01	0.00	5.	1		1320	161	0.20	0.01	0.19	1090.
1		0055	12	0.01	0.01	0.00	5.	1		1325	162	0.20	0.01	0.19	1127.
1		0100	13	0.01	0.01	0.00	5.	1		1330	163	0.20	0.01	0.19	1160.
1		0105	14	0.01	0.01	0.00	5.	1		1335	164	0.20	0.01	0.19	1188.
1		0110	15	0.01	0.01	0.00	5.	1		1340	165	0.20	0.01	0.19	1209.
1		0115	16	0.01	0.01	0.00	5.	1		1345	166	0.20	0.01	0.19	1223.
1		0120	17	0.01	0.01	0.00	5.	1		1350	167	0.20	0.01	0.19	1233.
1		0125	18	0.01	0.01	0.00	5.	1		1355	168	0.20	0.01	0.19	1241.
1		0130	19	0.01	0.01	0.00	5.	1		1400	169	0.20	0.01	0.19	1246.
1		0135	20	0.01	0.01	0.00	5.	1		1405	170	0.25	0.01	0.24	1255.
1		0140	21	0.01	0.01	0.00	5.	1		1410	171	0.25	0.01	0.24	1272.
1		0145	22	0.01	0.01	0.00	5.	1		1415	172	0.25	0.01	0.24	1306.
1		0150	23	0.01	0.01	0.00	5.	1		1420	173	0.25	0.01	0.24	1351.
1		0155	24	0.01	0.01	0.00	5.	1		1425	174	0.25	0.01	0.24	1401.
1		0200	25	0.01	0.01	0.00	5.	1		1430	175	0.25	0.01	0.24	1447.
1		0205	26	0.01	0.01	0.00	5.	1		1435	176	0.25	0.01	0.24	1486.
1		0210	27	0.01	0.01	0.00	5.	1		1440	177	0.25	0.01	0.24	1515.
1		0215	28	0.01	0.01	0.00	5.	1		1445	178	0.25	0.01	0.24	1535.
1		0220	29	0.01	0.01	0.00	5.	1		1450	179	0.25	0.01	0.24	1549.
1		0225	30	0.01	0.01	0.00	5.	1		1455	180	0.25	0.01	0.24	1560.
1		0230	31	0.01	0.01	0.00	5.	1		1500	181	0.25	0.01	0.24	1567.
1		0235	32	0.01	0.01	0.00	5.	1		1505	182	0.23	0.01	0.22	1571.

1	0805	98	0.02	0.01	0.02	100.	*	1	2035	246	0.01	0.01	0.01	37.
1	0810	99	0.02	0.01	0.02	103.	*	1	2040	249	0.01	0.01	0.01	37.
1	0815	100	0.02	0.01	0.02	105.	*	1	2045	250	0.01	0.01	0.01	37.
1	0820	101	0.02	0.01	0.02	107.	*	1	2050	251	0.01	0.01	0.01	37.
1	0825	102	0.02	0.01	0.02	108.	*	1	2055	252	0.01	0.01	0.01	37.
1	0830	103	0.02	0.01	0.02	109.	*	1	2100	253	0.01	0.01	0.01	37.
1	0835	104	0.02	0.01	0.02	110.	*	1	2105	254	0.01	0.01	0.01	37.
1	0840	105	0.02	0.01	0.02	110.	*	1	2110	255	0.01	0.01	0.01	37.
1	0845	106	0.02	0.01	0.02	111.	*	1	2115	256	0.01	0.01	0.01	37.
1	0850	107	0.02	0.01	0.02	111.	*	1	2120	257	0.01	0.01	0.01	37.
1	0855	108	0.02	0.01	0.02	111.	*	1	2125	258	0.01	0.01	0.01	37.
1	0900	109	0.02	0.01	0.02	111.	*	1	2130	259	0.01	0.01	0.01	37.
1	0905	110	0.02	0.01	0.02	111.	*	1	2135	260	0.01	0.01	0.01	37.
1	0910	111	0.02	0.01	0.02	111.	*	1	2140	261	0.01	0.01	0.01	37.
1	0915	112	0.02	0.01	0.02	111.	*	1	2145	262	0.01	0.01	0.01	37.
1	0920	113	0.02	0.01	0.02	111.	*	1	2150	263	0.01	0.01	0.01	37.
1	0925	114	0.02	0.01	0.02	111.	*	1	2155	264	0.01	0.01	0.01	37.
1	0930	115	0.02	0.01	0.02	111.	*	1	2200	265	0.01	0.01	0.01	37.
1	0935	116	0.02	0.01	0.02	111.	*	1	2205	266	0.01	0.01	0.01	37.
1	0940	117	0.02	0.01	0.02	111.	*	1	2210	267	0.01	0.01	0.01	37.
1	0945	118	0.02	0.01	0.02	111.	*	1	2215	268	0.01	0.01	0.01	37.
1	0950	119	0.02	0.01	0.02	111.	*	1	2220	269	0.01	0.01	0.01	37.
1	0955	120	0.02	0.01	0.02	111.	*	1	2225	270	0.01	0.01	0.01	37.
1	1000	121	0.02	0.01	0.02	111.	*	1	2230	271	0.01	0.01	0.01	37.
1	1005	122	0.02	0.01	0.02	111.	*	1	2235	272	0.01	0.01	0.01	37.
1	1010	123	0.02	0.01	0.02	111.	*	1	2240	273	0.01	0.01	0.01	37.
1	1015	124	0.02	0.01	0.02	111.	*	1	2245	274	0.01	0.01	0.01	37.
1	1020	125	0.02	0.01	0.02	111.	*	1	2250	275	0.01	0.01	0.01	37.
1	1025	126	0.02	0.01	0.02	111.	*	1	2255	276	0.01	0.01	0.01	37.
1	1030	127	0.02	0.01	0.02	111.	*	1	2300	277	0.01	0.01	0.01	37.
1	1035	128	0.02	0.01	0.02	111.	*	1	2305	278	0.01	0.01	0.01	37.
1	1040	129	0.02	0.01	0.02	111.	*	1	2310	279	0.01	0.01	0.01	37.
1	1045	130	0.02	0.01	0.02	111.	*	1	2315	280	0.01	0.01	0.01	37.
1	1050	131	0.02	0.01	0.02	111.	*	1	2320	281	0.01	0.01	0.01	37.
1	1055	132	0.02	0.01	0.02	111.	*	1	2325	282	0.01	0.01	0.01	37.
1	1100	133	0.02	0.01	0.02	111.	*	1	2330	283	0.01	0.01	0.01	37.
1	1105	134	0.02	0.01	0.02	111.	*	1	2335	284	0.01	0.01	0.01	37.
1	1110	135	0.02	0.01	0.02	111.	*	1	2340	285	0.01	0.01	0.01	37.
1	1115	136	0.02	0.01	0.02	111.	*	1	2345	286	0.01	0.01	0.01	37.
1	1120	137	0.02	0.01	0.02	111.	*	1	2350	287	0.01	0.01	0.01	37.
1	1125	138	0.02	0.01	0.02	111.	*	1	2355	288	0.01	0.01	0.01	37.
1	1130	139	0.02	0.01	0.02	111.	*	2	0000	289	0.0	0.0	0.0	37.
1	1135	140	0.02	0.01	0.02	111.	*	2	0005	290	0.0	0.0	0.0	35.
1	1140	141	0.02	0.01	0.02	111.	*	2	0010	291	0.0	0.0	0.0	32.
1	1145	142	0.02	0.01	0.02	111.	*	2	0015	292	0.0	0.0	0.0	27.
1	1150	143	0.02	0.01	0.02	111.	*	2	0020	293	0.0	0.0	0.0	22.
1	1155	144	0.02	0.01	0.02	111.	*	2	0025	294	0.0	0.0	0.0	17.
1	1200	145	0.02	0.01	0.02	111.	*	2	0030	295	0.0	0.0	0.0	13.
1	1205	146	0.17	0.01	0.16	125.	*	2	0035	296	0.0	0.0	0.0	10.
1	1210	147	0.17	0.01	0.16	167.	*	2	0040	297	0.0	0.0	0.0	8.
1	1215	148	0.17	0.01	0.16	256.	*	2	0045	298	0.0	0.0	0.0	6.
1	1220	149	0.17	0.01	0.16	382.	*	2	0050	299	0.0	0.0	0.0	5.
1	1225	150	0.17	0.01	0.16	520.	*	2	0055	300	0.0	0.0	0.0	5.
							*			SUM	23.22	2.53	20.68	

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
5433.	15.92	(CFS)	1732.	475.	458.	458.
		(INCHES)	18.950	20.791	20.798	20.798
		(AC-FT)	859.	943.	943.	943.

CUMULATIVE AREA = 0.85 SQ MI

HYDROGRAPH AT STATION A1
PLAN 1, RATIO = 0.50

1	0000	1	1.	*	1	0610	76	3.	*	1	1230	151	377.	*	1	1850	226	67.
1	0005	2	1.	*	1	0620	77	3.	*	1	1235	152	377.	*	1	1850	227	63.
1	0010	3	1.	*	1	0625	78	4.	*	1	1240	153	419.	*	1	1855	228	65.
1	0015	4	1.	*	1	0630	79	4.	*	1	1245	154	447.	*	1	1900	229	52.
1	0020	5	2.	*	1	0635	80	4.	*	1	1250	155	467.	*	1	1905	230	43.
1	0025	6	2.	*	1	0640	81	5.	*	1	1255	156	482.	*	1	1910	231	36.
1	0030	7	2.	*	1	0645	82	5.	*	1	1300	157	493.	*	1	1915	232	31.
1	0035	8	2.	*	1	0650	83	5.	*	1	1305	158	502.	*	1	1920	233	27.
1	0040	9	2.	*	1	0655	84	5.	*	1	1310	159	513.	*	1	1925	234	25.
1	0045	10	2.	*	1	0700	85	5.	*	1	1315	160	527.	*	1	1930	235	23.
1	0050	11	3.	*	1	0705	86	5.	*	1	1320	161	545.	*	1	1935	236	22.
1	0055	12	3.	*	1	0710	87	5.	*	1	1325	162	563.	*	1	1940	237	21.
1	0100	13	3.	*	1	0715	88	5.	*	1	1330	163	580.	*	1	1945	238	20.
1	0105	14	3.	*	1	0720	89	6.	*	1	1335	164	594.	*	1	1950	239	19.
1	0110	15	3.	*	1	0725	90	8.	*	1	1340	165	604.	*	1	1955	240	19.
1	0115	16	3.	*	1	0730	91	13.	*	1	1345	166	612.	*	1	2000	241	19.
1	0120	17	3.	*	1	0735	92	20.	*	1	1350	167	617.	*	1	2005	242	19.
1	0125	18	3.	*	1	0740	93	27.	*	1	1355	168	621.	*	1	2010	243	19.
1	0130	19	3.	*	1	0745	94	34.	*	1	1400	169	623.	*	1	2015	244	19.
1	0135	20	3.	*	1	0750	95	40.	*	1	1405	170	627.	*	1	2020	245	19.
1	0140	21	3.	*	1	0755	96	45.	*	1	1410	171	636.	*	1	2025	246	19.
1	0145	22	3.	*	1	0800	97	48.	*	1	1415	172	653.	*	1	2030	247	19.
1	0150	23	3.	*	1	0805	98	50.	*	1	1420	173	676.	*	1	2035	248	19.
1	0155	24	3.	*	1	0810	99	51.	*	1	1425	174	700.	*	1	2040	249	19.
1	0200	25	3.	*	1	0815	100	53.	*	1	1430	175	724.	*	1	2045	250	19.
1	0205	26	3.	*	1	0820	101	53.	*	1	1435	176	743.	*	1	2050	251	19.
1	0210	27	3.	*	1	0825	102	54.	*	1	1440	177	757.	*	1	2055	252	19.
1	0215	28	3.	*	1	0830	103	55.	*	1	1445	178	767.	*	1	2100	253	19.
1	0220	29	3.	*	1	0835	104	55.	*	1	1450	179	774.	*	1	2105	254	19.
1	0225	30	3.	*	1	0840	105	55.	*	1	1455	180	780.	*	1	2110	255	19.
1	0230	31	3.	*	1	0845	106	55.	*	1	1500	181	784.	*	1	2115	256	19.
1	0235	32	3.	*	1	0850	107	55.	*	1	1505	182	785.	*	1	2120	257	19.
1	0240	33	3.	*	1	0855	108	55.	*	1	1510	183	788.	*	1	2125	258	19.
1	0245	34	3.	*	1	0900	109	56.	*	1	1515	184	797.	*	1	2130	259	19.
1	0250	35	3.	*	1	0905	110	56.	*	1	1520	185	827.	*	1	2135	260	19.
1	0255	36	3.	*	1	0910	111	56.	*	1	1525	186	897.	*	1	2140	261	19.
1	0300	37	3.	*	1	0915	112	56.	*	1	1530	187	1044.	*	1	2145	262	19.
1	0305	38	3.	*	1	0920	113	56.	*	1	1535	188	1332.	*	1	2150	263	19.
1	0310	39	3.	*	1	0925	114	56.	*	1	1540	189	1757.	*	1	2155	264	19.
1	0315	40	3.	*	1	0930	115	56.	*	1	1545	190	2242.	*	1	2200	265	19.
1	0320	41	3.	*	1	0935	116	56.	*	1	1550	191	2596.	*	1	2205	266	19.
1	0325	42	3.	*	1	0940	117	56.	*	1	1555	192	2717.	*	1	2210	267	19.
1	0330	43	3.	*	1	0945	118	56.	*	1	1600	193	2621.	*	1	2215	268	19.
1	0335	44	3.	*	1	0950	119	56.	*	1	1605	194	2363.	*	1	2220	269	19.
1	0340	45	3.	*	1	0955	120	56.	*	1	1610	195	2024.	*	1	2225	270	19.
1	0345	46	3.	*	1	1000	121	56.	*	1	1615	196	1704.	*	1	2230	271	19.
1	0350	47	3.	*	1	1005	122	56.	*	1	1620	197	1450.	*	1	2235	272	19.
1	0355	48	3.	*	1	1010	123	56.	*	1	1625	198	1258.	*	1	2240	273	19.
1	0400	49	3.	*	1	1015	124	56.	*	1	1630	199	1114.	*	1	2245	274	19.
1	0405	50	3.	*	1	1020	125	56.	*	1	1635	200	1011.	*	1	2250	275	19.
1	0410	51	3.	*	1	1025	126	56.	*	1	1640	201	936.	*	1	2255	276	19.
1	0415	52	3.	*	1	1030	127	56.	*	1	1645	202	882.	*	1	2300	277	19.
1	0420	53	3.	*	1	1035	128	56.	*	1	1650	203	842.	*	1	2305	278	19.
1	0425	54	3.	*	1	1040	129	56.	*	1	1655	204	814.	*	1	2310	279	19.
1	0430	55	3.	*	1	1045	130	56.	*	1	1700	205	793.	*	1	2315	280	19.
1	0435	56	3.	*	1	1050	131	56.	*	1	1705	206	776.	*	1	2320	281	19.
1	0440	57	3.	*	1	1055	132	56.	*	1	1710	207	758.	*	1	2325	282	19.
1	0445	58	3.	*	1	1100	133	56.	*	1	1715	208	735.	*	1	2330	283	19.
1	0450	59	3.	*	1	1105	134	56.	*	1	1720	209	706.	*	1	2335	284	19.
1	0455	60	3.	*	1	1110	135	56.	*	1	1725	210	677.	*	1	2340	285	19.
1	0500	61	3.	*	1	1115	136	56.	*	1	1730	211	650.	*	1	2345	286	19.
1	0505	62	3.	*	1	1120	137	56.	*	1	1735	212	628.	*	1	2350	287	19.
1	0510	63	3.	*	1	1125	138	56.	*	1	1740	213	612.	*	1	2355	288	19.
1	0515	64	3.	*	1	1130	139	56.	*	1	1745	214	601.	*	2	0000	289	18.
1	0520	65	3.	*	1	1135	140	56.	*	1	1750	215	594.	*	2	0005	290	18.
1	0525	66	3.	*	1	1140	141	56.	*	1	1755	216	589.	*	2	0010	291	16.
1	0530	67	3.	*	1	1145	142	56.	*	1	1800	217	585.	*	2	0015	292	14.
1	0535	68	3.	*	1	1150	143	56.	*	1	1805	218	574.	*	2	0020	293	11.
1	0540	69	3.	*	1	1155	144	56.	*	1	1810	219	547.	*	2	0025	294	9.
1	0545	70	3.	*	1	1200	145	56.	*	1	1815	220	492.	*	2	0030	295	7.
1	0550	71	3.	*	1	1205	146	62.	*	1	1820	221	416.	*	2	0035	296	5.
1	0555	72	3.	*	1	1210	147	83.	*	1	1825	222	332.	*	2	0040	297	4.
1	0600	73	3.	*	1	1215	148	128.	*	1	1830	223	255.	*	2	0045	298	3.
1	0605	74	3.	*	1	1220	149	191.	*	1	1835	224	189.	*	2	0050	299	3.
1	0610	75	3.	*	1	1225	150	260.	*	1	1840	225	140.	*	2	0055	300	2.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
2717.	15.92	(CFS)	866.	238.	227.	229.
		(INCHES)	9.475	10.395	10.399	10.399
		(AC-FT)	430.	471.	471.	471.

CUMULATIVE AREA = 0.05 SQ MI

15 KK A2 ROUTE INFLOW HYDROGRAPH THROUGH KAMPFE LAKE

HYDROGRAPH ROUTING DATA

16 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC 154.00 INITIAL CONDITION
X 0.0 WORKING R AND D COEFFICIENT

17 SV	STORAGE	0.0	154.0	215.0	260.0	330.0	420.0	515.0
18 SE	ELEVATION	526.50	535.00	536.80	538.00	540.00	542.00	544.00
19 SQ	DISCHARGE	0.	83.	201.	987.	2560.	5009.	
20 SE	ELEVATION	535.00	536.00	536.80	538.00	539.00	540.00	

21 SS SPILLWAY
CREL 535.00 SPILLWAY CREST ELEVATION
SPWID 31.00 SPILLWAY WIDTH
COSW 2.66 WEIR COEFFICIENT
EXPW 1.50 EXPONENT OF HEAD

22 ST TOP OF DAM
TOPEL 536.80 ELEVATION AT TOP OF DAM
DAMWID 149.00 DAM WIDTH
COSD 2.64 WEIR COEFFICIENT
EXPD 1.50 EXPONENT OF HEAD

***

COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	154.00	187.69	215.00	260.00	295.00	330.00
OUTFLOW	0.0	83.00	201.00	987.00	2560.00	5009.00

HYDROGRAPH AT STATION A2
PLAN 1, RATIO = 0.50

	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
		0000	1	0.	154.0	535.0	1		0820	101	6.	157.3	535.1	1		1640	201	1324.	254.7	537.9
		0005	2	0.	154.0	535.0	1		0825	102	9.	157.6	535.1	1		1645	202	1238.	252.2	537.8
		0010	3	0.	154.0	535.0	1		0830	103	10.	157.9	535.1	1		1650	203	1161.	249.8	537.7
		0015	4	0.	154.0	535.0	1		0835	104	10.	158.2	535.1	1		1655	204	1094.	247.8	537.7
		0020	5	0.	154.0	535.0	1		0840	105	11.	158.5	535.1	1		1700	205	1037.	246.0	537.6
		0025	6	0.	154.0	535.0	1		0845	106	12.	158.8	535.1	1		1705	206	987.	244.4	537.6
		0030	7	0.	154.0	535.0	1		0850	107	13.	159.1	535.2	1		1710	207	944.	243.0	537.5
		0035	8	0.	154.1	535.0	1		0855	108	13.	159.4	535.2	1		1715	208	906.	241.8	537.5
		0040	9	0.	154.1	535.0	1		0900	109	14.	159.7	535.2	1		1720	209	871.	240.6	537.5
		0045	10	0.	154.1	535.0	1		0905	110	15.	160.0	535.2	1		1725	210	837.	239.5	537.5
		0050	11	0.	154.1	535.0	1		0910	111	15.	160.2	535.2	1		1730	211	804.	238.4	537.4

I	C055	12	0.	154.1	535.0	*	I	0915	112	16.	160.5	535.2	*	I	1735	212	774.	237.4	537.4
I	0100	13	0.	154.1	535.0	*	I	0920	113	17.	160.8	535.2	*	I	1740	213	745.	236.4	537.4
I	0105	14	0.	154.1	535.0	*	I	0925	114	17.	161.0	535.2	*	I	1745	214	720.	235.6	537.3
I	0110	15	0.	154.1	535.0	*	I	0930	115	18.	161.3	535.2	*	I	1750	215	698.	234.8	537.3
I	0115	16	0.	154.1	535.0	*	I	0935	116	19.	161.6	535.2	*	I	1755	216	678.	234.1	537.3
I	0120	17	0.	154.1	535.0	*	I	0940	117	19.	161.8	535.2	*	I	1800	217	662.	233.5	537.3
I	0125	18	0.	154.1	535.0	*	I	0945	118	20.	162.1	535.2	*	I	1805	218	647.	233.0	537.3
I	0130	19	0.	154.1	535.0	*	I	0950	119	20.	162.3	535.2	*	I	1810	219	632.	232.5	537.3
I	0135	20	0.	154.2	535.0	*	I	0955	120	21.	162.5	535.3	*	I	1815	220	612.	231.8	537.2
I	0140	21	0.	154.2	535.0	*	I	1000	121	21.	162.8	535.3	*	I	1820	221	584.	230.8	537.2
I	0145	22	0.	154.2	535.0	*	I	1005	122	22.	163.0	535.3	*	I	1825	222	548.	229.5	537.2
I	0150	23	0.	154.2	535.0	*	I	1010	123	23.	163.2	535.3	*	I	1830	223	504.	227.9	537.1
I	0155	24	0.	154.2	535.0	*	I	1015	124	23.	163.4	535.3	*	I	1835	224	457.	226.1	537.1
I	0200	25	0.	154.2	535.0	*	I	1020	125	24.	163.7	535.3	*	I	1840	225	410.	224.2	537.0
I	0205	26	1.	154.2	535.0	*	I	1025	126	24.	163.9	535.3	*	I	1845	226	364.	222.4	537.0
I	0210	27	1.	154.2	535.0	*	I	1030	127	25.	164.1	535.3	*	I	1850	227	323.	220.7	537.0
I	0215	28	1.	154.2	535.0	*	I	1035	128	25.	164.3	535.3	*	I	1855	228	286.	219.1	536.9
I	0220	29	1.	154.2	535.0	*	I	1040	129	26.	164.5	535.3	*	I	1900	229	254.	217.6	536.9
I	0225	30	1.	154.2	535.0	*	I	1045	130	26.	164.7	535.3	*	I	1905	230	226.	216.3	536.8
I	0230	31	1.	154.2	535.0	*	I	1050	131	27.	164.9	535.3	*	I	1910	231	202.	215.1	536.8
I	0235	32	1.	154.3	535.0	*	I	1055	132	27.	165.1	535.3	*	I	1915	232	196.	213.9	536.8
I	0240	33	1.	154.3	535.0	*	I	1100	133	28.	165.3	535.3	*	I	1920	233	191.	212.8	536.7
I	0245	34	1.	154.3	535.0	*	I	1105	134	28.	165.5	535.3	*	I	1925	234	186.	211.7	536.7
I	0250	35	1.	154.3	535.0	*	I	1110	135	29.	165.6	535.3	*	I	1930	235	182.	210.5	536.7
I	0255	36	1.	154.3	535.0	*	I	1115	136	29.	165.8	535.3	*	I	1935	236	177.	209.5	536.6
I	0300	37	1.	154.3	535.0	*	I	1120	137	29.	166.0	535.4	*	I	1940	237	172.	208.4	536.6
I	0305	38	1.	154.3	535.0	*	I	1125	138	30.	166.2	535.4	*	I	1945	238	168.	207.4	536.6
I	0310	39	1.	154.3	535.0	*	I	1130	139	30.	166.4	535.4	*	I	1950	239	163.	206.4	536.5
I	0315	40	1.	154.3	535.0	*	I	1135	140	31.	166.5	535.4	*	I	1955	240	159.	205.4	536.5
I	0320	41	1.	154.3	535.0	*	I	1140	141	31.	166.7	535.4	*	I	2000	241	155.	204.4	536.5
I	0325	42	1.	154.3	535.0	*	I	1145	142	31.	166.9	535.4	*	I	2005	242	151.	203.5	536.5
I	0330	43	1.	154.3	535.0	*	I	1150	143	32.	167.0	535.4	*	I	2010	243	147.	202.6	536.4
I	0335	44	1.	154.4	535.0	*	I	1155	144	32.	167.2	535.4	*	I	2015	244	143.	201.7	536.4
I	0340	45	1.	154.4	535.0	*	I	1200	145	33.	167.3	535.4	*	I	2020	245	139.	200.9	536.4
I	0345	46	1.	154.4	535.0	*	I	1205	146	33.	167.5	535.4	*	I	2025	246	136.	200.0	536.4
I	0350	47	1.	154.4	535.0	*	I	1210	147	34.	167.8	535.4	*	I	2030	247	132.	199.2	536.3
I	0355	48	1.	154.4	535.0	*	I	1215	148	35.	168.3	535.4	*	I	2035	248	129.	198.5	536.3
I	0400	49	1.	154.4	535.0	*	I	1220	149	37.	169.1	535.4	*	I	2040	249	126.	197.7	536.3
I	0405	50	1.	154.4	535.0	*	I	1225	150	40.	170.4	535.5	*	I	2045	250	123.	197.0	536.3
I	0410	51	1.	154.4	535.0	*	I	1230	151	44.	172.1	535.5	*	I	2050	251	119.	196.3	536.2
I	0415	52	1.	154.4	535.0	*	I	1235	152	49.	174.2	535.6	*	I	2055	252	116.	195.6	536.2
I	0420	53	1.	154.4	535.0	*	I	1240	153	55.	176.6	535.7	*	I	2100	253	114.	194.9	536.2
I	0425	54	1.	154.4	535.0	*	I	1245	154	62.	179.2	535.7	*	I	2105	254	111.	194.3	536.2
I	0430	55	1.	154.4	535.0	*	I	1250	155	68.	181.8	535.8	*	I	2110	255	108.	193.6	536.2
I	0435	56	1.	154.5	535.0	*	I	1255	156	75.	184.6	535.9	*	I	2115	256	105.	193.0	536.2
I	0440	57	1.	154.5	535.0	*	I	1300	157	82.	187.4	536.0	*	I	2120	257	103.	192.4	536.1
I	0445	58	1.	154.5	535.0	*	I	1305	158	93.	190.3	536.1	*	I	2125	258	100.	191.9	536.1
I	0450	59	1.	154.5	535.0	*	I	1310	159	106.	193.1	536.2	*	I	2130	259	98.	191.3	536.1
I	0455	60	1.	154.5	535.0	*	I	1315	160	118.	195.9	536.2	*	I	2135	260	96.	190.8	536.1
I	0500	61	1.	154.5	535.0	*	I	1320	161	130.	198.7	536.3	*	I	2140	261	93.	190.2	536.1
I	0505	62	1.	154.5	535.0	*	I	1325	162	143.	201.6	536.4	*	I	2145	262	91.	189.7	536.1
I	0510	63	1.	154.5	535.0	*	I	1330	163	155.	204.5	536.5	*	I	2150	263	89.	189.2	536.0
I	0515	64	1.	154.5	535.0	*	I	1335	164	168.	207.4	536.6	*	I	2155	264	87.	188.8	536.0
I	0520	65	1.	154.5	535.0	*	I	1340	165	181.	210.3	536.7	*	I	2200	265	85.	188.3	536.0
I	0525	66	1.	154.5	535.0	*	I	1345	166	193.	213.2	536.7	*	I	2205	266	83.	187.8	536.0
I	0530	67	1.	154.5	535.0	*	I	1350	167	221.	216.0	536.8	*	I	2210	267	82.	187.4	536.0
I	0535	68	1.	154.6	535.0	*	I	1355	168	275.	218.6	536.9	*	I	2215	268	81.	187.0	536.0
I	0540	69	1.	154.6	535.0	*	I	1400	169	326.	220.8	537.0	*	I	2220	269	80.	186.5	536.0
I	0545	70	1.	154.6	535.0	*	I	1405	170	372.	222.7	537.0	*	I	2225	270	79.	186.1	535.9
I	0550	71	1.	154.6	535.0	*	I	1410	171	413.	224.3	537.0	*	I	2230	271	78.	185.7	535.9
I	0555	72	1.	154.6	535.0	*	I	1415	172	450.	225.8	537.1	*	I	2235	272	77.	185.3	535.9
I	0600	73	1.	154.6	535.0	*	I	1420	173	486.	227.1	537.1	*	I	2240	273	76.	184.9	535.9
I	0605	74	1.	154.6	535.0	*	I	1425	174	519.	228.4	537.2	*	I	2245	274	75.	184.5	535.9
I	0610	75	1.	154.6	535.0	*	I	1430	175	552.	229.6	537.2	*	I	2250	275	74.	184.1	535.9
I	0615	76	2.	154.6	535.0	*	I	1435	176	583.	230.8	537.2	*	I	2255	276	73.	183.8	535.9
I	0620	77	2.	154.6	535.0	*	I	1440	177	612.	231.8	537.2	*	I	2300	277	72.	183.4	535.9
I	0625	78	2.	154.6	535.0	*	I	1445	178	639.	232.7	537.3	*	I	2305	278	71.	183.0	535.9

1	0630	79	2.	154.7	535.0	*	1	1450	179	662.	233.6	537.3	*	1	2310	279	70.	182.7	535.6
1	0635	80	2.	154.7	535.0	*	1	1455	180	683.	234.3	537.3	*	1	2315	280	69.	182.3	535.6
1	0640	81	2.	154.7	535.0	*	1	1500	181	700.	234.9	537.3	*	1	2320	281	68.	181.9	535.6
1	0645	82	2.	154.7	535.0	*	1	1505	182	715.	235.4	537.3	*	1	2325	282	68.	181.6	535.6
1	0650	83	2.	154.7	535.0	*	1	1510	183	728.	235.8	537.4	*	1	2330	283	67.	181.3	535.6
1	0655	84	2.	154.7	535.0	*	1	1515	184	740.	236.2	537.4	*	1	2335	284	66.	180.9	535.8
1	0700	85	2.	154.8	535.0	*	1	1520	185	753.	236.7	537.4	*	1	2340	285	65.	180.6	535.8
1	0705	86	2.	154.8	535.0	*	1	1525	186	773.	237.4	537.4	*	1	2345	286	64.	180.3	535.8
1	0710	87	2.	154.8	535.0	*	1	1530	187	809.	238.6	537.4	*	1	2350	287	64.	180.0	535.8
1	0715	88	2.	154.8	535.0	*	1	1535	188	881.	240.9	537.5	*	1	2355	288	63.	179.7	535.8
1	0720	89	2.	154.8	535.0	*	1	1540	189	1009.	245.1	537.6	*	2	0000	289	62.	179.4	535.7
1	0725	90	2.	154.9	535.0	*	1	1545	190	1207.	251.2	537.8	*	2	0005	290	61.	179.1	535.7
1	0730	91	2.	154.9	535.0	*	1	1550	191	1459.	258.7	538.0	*	2	0010	291	61.	178.8	535.7
1	0735	92	2.	155.0	535.0	*	1	1555	192	1760.	265.6	538.2	*	2	0015	292	60.	178.4	535.7
1	0740	93	3.	155.1	535.0	*	1	1600	193	2155.	270.1	538.3	*	2	0020	293	59.	178.1	535.7
1	0745	94	3.	155.3	535.0	*	1	1605	194	2279.	272.0	538.3	*	2	0025	294	58.	177.8	535.7
1	0750	95	4.	155.6	535.0	*	1	1610	195	2247.	271.5	538.3	*	2	0030	295	57.	177.4	535.7
1	0755	96	4.	155.6	535.1	*	1	1615	196	2106.	269.3	538.3	*	2	0035	296	56.	177.1	535.7
1	0800	97	5.	156.1	535.1	*	1	1620	197	1912.	266.4	538.2	*	2	0040	297	56.	176.7	535.7
1	0805	98	6.	156.4	535.1	*	1	1625	198	1709.	263.2	538.1	*	2	0045	298	55.	176.4	535.7
1	0810	99	7.	156.7	535.1	*	1	1630	199	1521.	260.3	538.0	*	2	0050	299	54.	176.0	535.6
1	0815	100	7.	157.0	535.1	*	1	1635	200	1417.	257.5	537.9	*	2	0055	300	53.	175.6	535.6

AK OUTFLOW IS 2279. AT TIME 16.08 HOURS

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
2279.	16.08	(CFS)	786.	226.	218.	218.
		(INCHES)	8.600	9.695	9.895	9.695
		(AC-FT)	390.	449.	449.	449.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
272.	16.08	236.	186.	184.	184.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
538.34	16.08	537.34	535.90	535.86	535.86

CUMULATIVE AREA = 0.65 SQ MI

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO FLOWS RATIO 1 0.10	RATIO 2 0.25	RATIO 3 0.50
HYDROGRAPH AT	A1	0.05	1	FLOW	543.	1358.	2717.
				TIME	15.92	15.92	15.92
ROUTED TC	A2	0.05	1	FLOW	155.	949.	2279.
				TIME	17.08	16.17	16.08
			** PEAK STAGES IN FEET **				
			1	STAGE	536.45	537.55	538.34
				TIME	17.08	16.17	16.08

SUMMARY OF DAM OVERTOPPING/FAILURE ANALYSIS FOR STATION A2

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	535.00	535.00	536.50
STORAGE	154.	154.	215.
OUTFLOW	0.	0.	201.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.10	536.49	0.0	204.	155.	0.0	17.06	0.0
0.25	537.55	0.75	243.	949.	3.42	16.17	0.0
0.50	538.34	1.54	272.	2279.	5.42	16.08	0.0

-NORMAL-END-OF-JOB-

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1     ID    KAMPEL LAKE DAM      BREACH ANALYSIS          ##KNOXVILLE A-N&CO INC##
    2     ID    NEW JERSEY DAM NO.777  PASSAIC COUNTY  BOROUGH OF BLOOMINGDALE
    3     IT       5        0        0      200
    4     IO       2        1

    5     KK      A1 KAMPEL LAKE
    6     01     200      200      200      200      300      300

    7     KK      A2  ROUTE INFLOW HYDROGRAPH THROUGH KAMPEE LAKE
    8     KO       2        2
    9     RS       1     STOR      154
   10     SV       0      154      215      260      330      420      515
   11     SE   526.5      535    536.5      538      540      542      544
   12     SQ       0       83      201      987     2560     5009
   13     SL     535      536    536.8      538      539      540
   14     SS     535       31     2.68      1.5
   15     ST   536.8      149     2.64      1.5
   16     SB   526.5       55        1        1    536.6

   17     KK      A5  ROUTE BREACHED OUTFLOW THROUGH STAR LAKE
   18     RS       1     FLOW      200
   19     SV       0      115      136      150      165      172      197      225
   20     SE   521.6    529.9      531    531.6    532.1    532.6    533.7      535
   21     SQ       0        0      174      334      629     1413     3245     7360
   22     SE   521.6    529.9      531    531.6    532.1    532.6    533.7      535
   23     SS   529.9       52      2.9      1.5
   24     ST   531.6      148      2.7      1.5
   25     ZZ
```

```
**********
*                                *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)   *
*         FEBRUARY 1981          *
*                                *
*                                *
*  RUN DATE07/22/81      TIME10.10.24  *
*                                *
**********
```


```
**********
*                                *
*     U.S. ARMY CORPS OF ENGINEERS     *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*        609 SECOND STREET       *
*      DAVIS, CALIFORNIA 95616   *
*  (916) 440-3265 OR (FTS) 448-3265  *
*                                *
**********
```


KAMPFF LAKE DAM PREACH ANALYSIS ##KASOMERVILLE A-NGCO INC##
NEW JERSEY DAM NO. 772 PASSAIC COUNTY BOROUGH OF BLOOMINGDALE

```
  4 IO          OUTPUT CONTROL VARIABLES
                    IPRNT        2  PRINT CONTROL
                    IPLOT        1  PLOT CONTROL
                    QSCAL        0.  HYDROGRAPH PLOT SCALE
                     DMSG      YES  PRINT DIAGNOSTIC MESSAGES

 -11 ----         HYDROGRAPH TIME DATA
                    TMIN        5  MINUTES IN COMPUTATION INTERVAL
                   IDATE        1    0  STARTING DATE
                   ITIME           0000  STARTING TIME
                      NQ          200  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE        1    0  ENDING DATE
                   NDTIME        1635  ENDING TIME

                COMPUTATION INTERVAL      0.08 HOURS
                   TOTAL TIME BASE      16.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **********
            *        *
  5 KK      *   A1   *      KAMPFF LAKE
            *        *
            **********

               SUBBASIN RUNOFF DATA

  0 BA          SUBBASIN CHARACTERISTICS
                    TAREA        0.0   SUBBASIN AREA

                                                                    ***

**********************************************************************************************************************************

                                        HYDROGRAPH AT STATION      A1

**********************************************************************************************************************************
```

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	200.	1		0410	51	300.	1		0820	101	300.	1		1230	151	300.
1		0005	2	200.	1		0415	52	300.	1		0825	102	300.	1		1235	152	300.
1		0010	3	200.	1		0420	53	300.	1		0830	103	300.	1		1240	153	300.
1		0015	4	200.	1		0425	54	300.	1		0835	104	300.	1		1245	154	300.
1		0020	5	300.	1		0430	55	300.	1		0840	105	300.	1		1250	155	300.
1		0025	6	300.	1		0435	56	300.	1		0845	106	300.	1		1255	156	300.
1		0030	7	300.	1		0440	57	300.	1		0850	107	300.	1		1300	157	300.
1		0035	8	300.	1		0445	58	300.	1		0855	108	300.	1		1305	158	300.
1		0040	9	300.	1		0450	59	300.	1		0900	109	300.	1		1310	159	300.
1		0045	10	300.	1		0455	60	300.	1		0905	110	300.	1		1315	160	300.
1		0050	11	300.	1		0500	61	300.	1		0910	111	300.	1		1320	161	300.
1		0055	12	300.	1		0505	62	300.	1		0915	112	300.	1		1325	162	300.
1		0100	13	300.	1		0510	63	300.	1		0920	113	300.	1		1330	163	300.
1		0105	14	300.	1		0515	64	300.	1		0925	114	300.	1		1335	164	300.
1		0110	15	300.	1		0520	65	300.	1		0930	115	300.	1		1340	165	300.
1		0115	16	300.	1		0525	66	300.	1		0935	116	300.	1		1345	166	300.
1		0120	17	300.	1		0530	67	300.	1		0940	117	300.	1		1350	167	300.
1		0125	18	300.	1		0535	68	300.	1		0945	118	300.	1		1355	168	300.
1		0130	19	300.	1		0540	69	300.	1		0950	119	300.	1		1400	169	300.
1		0135	20	300.	1		0545	70	300.	1		0955	120	300.	1		1405	170	300.
1		0140	21	300.	1		0550	71	300.	1		1000	121	300.	1		1410	171	300.
1		0145	22	300.	1		0555	72	300.	1		1005	122	300.	1		1415	172	300.
1		0150	23	300.	1		0600	73	300.	1		1010	123	300.	1		1420	173	300.
1		0155	24	300.	1		0605	74	300.	1		1015	124	300.	1		1425	174	300.
1		0200	25	300.	1		0610	75	300.	1		1020	125	300.	1		1430	175	300.
1		0205	26	300.	1		0615	76	300.	1		1025	126	300.	1		1435	176	300.
1		0210	27	300.	1		0620	77	300.	1		1030	127	300.	1		1440	177	300.
1		0215	28	300.	1		0625	78	300.	1		1035	128	300.	1		1445	178	300.
1		0220	29	300.	1		0630	79	300.	1		1040	129	300.	1		1450	179	300.
1		0225	30	300.	1		0635	80	300.	1		1045	130	300.	1		1455	180	300.
1		0230	31	300.	1		0640	81	300.	1		1050	131	300.	1		1500	181	300.
1		0235	32	300.	1		0645	82	300.	1		1055	132	300.	1		1505	182	300.
1		0240	33	300.	1		0650	83	300.	1		1100	133	300.	1		1510	183	300.
1		0245	34	300.	1		0655	84	300.	1		1105	134	300.	1		1515	184	300.
1		0250	35	300.	1		0700	85	300.	1		1110	135	300.	1		1520	185	300.
1		0255	36	300.	1		0705	86	300.	1		1115	136	300.	1		1525	186	300.
1		0300	37	300.	1		0710	87	300.	1		1120	137	300.	1		1530	187	300.
1		0305	38	300.	1		0715	88	300.	1		1125	138	300.	1		1535	188	300.
1		0310	39	300.	1		0720	89	300.	1		1130	139	300.	1		1540	189	300.
1		0315	40	300.	1		0725	90	300.	1		1135	140	300.	1		1545	190	300.
1		0320	41	300.	1		0730	91	300.	1		1140	141	300.	1		1550	191	300.
1		0325	42	300.	1		0735	92	300.	1		1145	142	300.	1		1555	192	300.
1		0330	43	300.	1		0740	93	300.	1		1150	143	300.	1		1600	193	300.
1		0335	44	300.	1		0745	94	300.	1		1155	144	300.	1		1605	194	300.
1		0340	45	300.	1		0750	95	300.	1		1200	145	300.	1		1610	195	300.
1		0345	46	300.	1		0755	96	300.	1		1205	146	300.	1		1615	196	300.
1		0350	47	300.	1		0800	97	300.	1		1210	147	300.	1		1620	197	300.
1		0355	48	300.	1		0805	98	300.	1		1215	148	300.	1		1625	198	300.
1		0400	49	300.	1		0810	99	300.	1		1220	149	300.	1		1630	199	300.
1		0405	50	300.	1		0815	100	300.	1		1225	150	300.	1		1635	200	300.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	16.58-HR
300.	0.33	(CFS)	300.	298.	298.	298.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	149.	409.	409.	409.

CUMULATIVE AREA = 0.0 SQ MI

*** ***

```
 7 KK        A2          ROUTE INFLOW HYDROGRAPH THROUGH KAMPEE LAKE

 8 KO          OUTPUT CONTROL VARIABLES
                 IPRNT        2  PRINT CONTROL
                 IPLOT        2  PLOT CONTROL
                 QSCAL       0.  HYDROGRAPH PLOT SCALE

             HYDROGRAPH ROUTING DATA

 9 RS          STORAGE ROUTING
                 NSTPS        1  NUMBER OF SUBREACHES
                 ITYP      STOR  TYPE OF INITIAL CONDITION
                RSVRIC    154.00  INITIAL CONDITION
                     X       0.0  WORKING R AND D COEFFICIENT

10 SV          STORAGE       0.0     154.0     215.0     260.0     330.0     420.0     515.0

11 SE          ELEVATION   526.50    535.00    536.80    538.00    540.00    542.00    544.00

12 SQ          DISCHARGE       0.        83.       201.      987.     2560.     5009.

13 SE          ELEVATION   535.00    536.00    536.80    538.00    539.00    540.00

14 SS          SPILLWAY
                 CREL      535.00  SPILLWAY CREST ELEVATION
                 SPWID      31.00  SPILLWAY WIDTH
                 COQW        2.68  WEIR COEFFICIENT
                 EXPW        1.50  EXPONENT OF HEAD

15 ST          TOP OF DAM
                 TOPEL     536.80  ELEVATION AT TOP OF DAM
                CARWID     149.00  DAM WIDTH
                 COQD        2.64  WEIR COEFFICIENT
                 EXPD        1.50  EXPONENT OF HEAD

16 SB          BREACH DATA
                 ELBM      526.50  ELEVATION AT BOTTOM OF BREACH
                BRWID       55.00  WIDTH OF BREACH BOTTOM
                    Z        1.00  BREACH SIDE SLOPE
                TFAIL        1.00  TIME FOR BREACH TO DEVELOP
                FAILEL     536.80  R.S. ELEVATION TO TRIGGER FAILURE

                                                ***

                                  COMPUTED STORAGE-OUTFLOW CURVE
          STORAGE      154.00     187.89     215.00     260.00     295.00     330.00
          OUTFLOW         0.0      83.00     201.00     987.00    2560.00    5009.00

BEGIN DAM FAILURE AT  3.92 HOURS

                                  HYDROGRAPH AT STATION       A2

 DA MON HRMN GRD  OUTFLOW  STORAGE   STAGE   DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE   DA MON HRMN ORD  OUTFLOW  STORAGE   ST
  1     0000   1       0.    154.0   535.0    1    0535  68    811.    50.2   529.3    1    1110 135     300.    26.2   52
  1     0005   2       3.    155.4   535.0    1    0540  69    732.    46.9   529.1    1    1115 136     300.    26.2   52
  1     0010   3       7.    156.7   535.1    1    0545  70    667.    44.2   528.9    1    1120 137     300.    26.2   52
  1     0015   4      10.    158.0   535.1    1    0550  71    614.    41.8   528.8    1    1125 138     300.    26.2   52
  1     0020   5      14.    159.7   535.2    1    0555  72    569.    39.8   528.7    1    1130 139     300.    26.2   52
  1     0025   6      19.    161.6   535.2    1    0600  73    532.    38.1   528.6    1    1135 140     300.    26.2   52
  1     0030   7      23.    163.5   535.3    1    0605  74    500.    36.6   528.5    1    1140 141     300.    26.2   52
  1     0035   8      28.    165.4   535.3    1    0610  75    474.    35.3   528.4    1    1145 142     300.    26.2   52
  1     0040   9      33.    167.3   535.4    1    0615  76    451.    34.2   528.4    1    1150 143     300.    26.2   52
  1     0045  10      37.    169.1   535.4    1    0620  77    431.    33.2   528.3    1    1155 144     300.    26.2   52
```

AD-A102 672 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM. KAMPFE LAKE DAM (NJ00772), PASSAIC--ETC(U)
JUL 81 W A GUINAN DACW61-79-C-0011

UNCLASSIFIED DAEN/NAP-53842/NJ00772-81/ NL

2 OF 2
AD
A102672

END
DATE FILMED
9 81
DTIC

1	0050	11	41.	170.9	535.5	*	1	0625	78	415.	32.4	528.3	*	1	1200	145	300.	26.2	527.
1	0055	12	46.	172.6	535.6	*	1	0630	79	400.	31.6	528.2	*	1	1205	146	300.	26.2	527.
1	0100	13	50.	174.4	535.6	*	1	0635	80	386.	31.0	528.2	*	1	1210	147	300.	26.2	527.
1	0105	14	54.	176.1	535.7	*	1	0640	81	377.	30.4	528.2	*	1	1215	148	300.	26.2	527.
1	0110	15	58.	177.8	535.7	*	1	0645	82	367.	29.9	528.1	*	1	1220	149	300.	26.2	527.
1	0115	16	62.	179.4	535.7	*	1	0650	83	359.	29.4	528.1	*	1	1225	150	300.	26.2	527.
1	0120	17	66.	181.0	535.8	*	1	0655	84	352.	29.0	528.1	*	1	1230	151	300.	26.2	527.
1	0125	18	70.	182.6	535.8	*	1	0700	85	346.	28.7	528.1	*	1	1235	152	300.	26.2	527.
1	0130	19	74.	184.2	535.9	*	1	0705	86	340.	28.4	528.1	*	1	1240	153	300.	26.2	527.
1	0135	20	78.	185.7	535.9	*	1	0710	87	335.	28.1	528.1	*	1	1245	154	300.	26.2	527.
1	0140	21	81.	187.2	536.0	*	1	0715	88	331.	27.9	528.0	*	1	1250	155	300.	26.2	527.
1	0145	22	87.	188.7	536.0	*	1	0720	89	327.	27.7	528.0	*	1	1255	156	300.	26.2	527.
1	0150	23	93.	190.2	536.1	*	1	0725	90	324.	27.5	528.0	*	1	1300	157	300.	26.2	527.
1	0155	24	99.	191.6	536.1	*	1	0730	91	321.	27.3	528.0	*	1	1305	158	300.	26.2	527.
1	0200	25	105.	192.9	536.1	*	1	0735	92	319.	27.2	528.0	*	1	1310	159	300.	26.2	527.
1	0205	26	111.	194.2	536.2	*	1	0740	93	316.	27.1	528.0	*	1	1315	160	300.	26.2	527.
1	0210	27	116.	195.5	536.2	*	1	0745	94	314.	27.0	528.0	*	1	1320	161	300.	26.2	527.
1	0215	28	122.	196.8	536.3	*	1	0750	95	312.	26.9	528.0	*	1	1325	162	300.	26.2	527.
1	0220	29	127.	198.0	536.3	*	1	0755	96	311.	26.8	528.0	*	1	1330	163	300.	26.2	527.
1	0225	30	132.	199.1	536.3	*	1	0800	97	310.	26.7	528.0	*	1	1335	164	300.	26.2	527.
1	0230	31	137.	200.3	536.4	*	1	0805	98	308.	26.6	528.0	*	1	1340	165	300.	26.2	527.
1	0235	32	142.	201.4	536.4	*	1	0810	99	307.	26.6	528.0	*	1	1345	166	300.	26.2	527.
1	0240	33	146.	202.4	536.4	*	1	0815	100	306.	26.5	528.0	*	1	1350	167	300.	26.2	527.
1	0245	34	151.	203.5	536.5	*	1	0820	101	305.	26.5	528.0	*	1	1355	168	300.	26.2	527.
1	0250	35	155.	204.5	536.5	*	1	0825	102	305.	26.4	528.0	*	1	1400	169	300.	26.2	527.
1	0255	36	159.	205.5	536.5	*	1	0830	103	304.	26.4	528.0	*	1	1405	170	300.	26.2	527.
1	0300	37	164.	206.4	536.5	*	1	0835	104	303.	26.4	528.0	*	1	1410	171	300.	26.2	527.
1	0305	38	168.	207.3	536.6	*	1	0840	105	303.	26.3	528.0	*	1	1415	172	300.	26.2	527.
1	0310	39	172.	208.2	536.6	*	1	0845	106	302.	26.3	528.0	*	1	1420	173	300.	26.2	527.
1	0315	40	175.	209.1	536.6	*	1	0850	107	302.	26.3	528.0	*	1	1425	174	300.	26.2	527.
1	0320	41	179.	209.9	536.7	*	1	0855	108	302.	26.3	527.9	*	1	1430	175	300.	26.2	527.
1	0325	42	183.	210.8	536.7	*	1	0900	109	302.	26.2	527.9	*	1	1435	176	300.	26.2	527.
1	0330	43	186.	211.5	536.7	*	1	0905	110	301.	26.2	527.9	*	1	1440	177	300.	26.2	527.
1	0335	44	189.	212.3	536.7	*	1	0910	111	301.	26.2	527.9	*	1	1445	178	300.	26.2	527.
1	0340	45	193.	213.1	536.7	*	1	0915	112	301.	26.2	527.9	*	1	1450	179	300.	26.2	527.
1	0345	46	196.	213.8	536.8	*	1	0920	113	300.	26.2	527.9	*	1	1455	180	300.	26.2	527.
1	0350	47	199.	214.5	536.8	*	1	0925	114	300.	26.2	527.9	*	1	1500	181	300.	26.2	527.
1	0355	48	204.	215.2	536.8	*	1	0930	115	300.	26.2	527.9	*	1	1505	182	300.	26.2	527.
1	0400	49	220.	215.7	536.8	*	1	0935	116	300.	26.2	527.9	*	1	1510	183	300.	26.2	527.
1	0405	50	295.	216.0	536.8	*	1	0940	117	300.	26.2	527.9	*	1	1515	184	300.	26.2	527.
1	0410	51	410.	215.6	536.8	*	1	0945	118	300.	26.2	527.9	*	1	1520	185	300.	26.2	527.
1	0415	52	600.	214.2	536.8	*	1	0950	119	300.	26.2	527.9	*	1	1525	186	300.	26.2	527.
1	0420	53	875.	211.2	536.7	*	1	0955	120	300.	26.2	527.9	*	1	1530	187	300.	26.2	527.
1	0425	54	1207.	206.1	536.5	*	1	1000	121	300.	26.2	527.9	*	1	1535	188	300.	26.2	527.
1	0430	55	1587.	198.6	536.3	*	1	1005	122	300.	26.2	527.9	*	1	1540	189	300.	26.2	527.
1	0435	56	1999.	188.3	536.0	*	1	1010	123	300.	26.2	527.9	*	1	1545	190	300.	26.2	527.
1	0440	57	2446.	175.0	535.6	*	1	1015	124	300.	26.2	527.9	*	1	1550	191	300.	26.2	527.
1	0445	58	2890.	158.7	535.1	*	1	1020	125	300.	26.2	527.9	*	1	1555	192	300.	26.2	527.
1	0450	59	3094.	139.9	534.2	*	1	1025	126	300.	26.2	527.9	*	1	1600	193	300.	26.2	527.
1	0455	60	3178.	120.4	533.1	*	1	1030	127	300.	26.2	527.9	*	1	1605	194	300.	26.2	527.
1	0500	61	2486.	103.1	532.2	*	1	1035	128	300.	26.2	527.9	*	1	1610	195	300.	26.2	527.
1	0505	62	2001.	89.8	531.5	*	1	1040	129	300.	26.2	527.9	*	1	1615	196	300.	26.2	527.
1	0510	63	1649.	79.3	530.9	*	1	1045	130	300.	26.2	527.9	*	1	1620	197	300.	26.2	527.
1	0515	64	1367.	70.9	530.4	*	1	1050	131	300.	26.2	527.9	*	1	1625	198	300.	26.2	527.
1	0520	65	1187.	64.2	530.0	*	1	1055	132	300.	26.2	527.9	*	1	1630	199	300.	26.2	527.
1	0525	66	1032.	58.6	529.7	*	1	1100	133	300.	26.2	527.9	*	1	1635	200	300.	26.2	527.
1	0530	67	909.	54.0	529.5	*	1	1105	134	300.	26.2	527.9	*						

.AK OUTFLOW IS 3170. AT TIME 4.92 HOURS

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	16.58-HR
3170.	4.92	(CFS)	663.	391.	391.	391.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	336.	536.	536.	536.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	16.58-HR
216.	4.08	167.	78.	78.	78.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	16.58-HR
530.63	4.08	534.99	530.50	530.50	530.50

CUMULATIVE AREA = 0.0 SQ MI

```
17 KK        AS          ROUTL BREACHED OUTFLOW THROUGH STAR LAKE

              HYDROGRAPH ROUTING DATA

18 RS        STORAGE ROUTING
                  NSTPS          1  NUMBER OF SUBREACHES
                   ITYP       FLOW  TYPE OF INITIAL CONDITION
                 RSVRIC     200.00  INITIAL CONDITION
                      X        0.0  WORKING R AND D COEFFICIENT

19 SV          STORAGE        0.0      115.0      136.0      150.0      165.0      172.0      197.0      225.0
20 SE          ELEVATION    521.60     529.90     531.00     531.60     532.10     532.60     533.70     535.00
21 SQ          DISCHARGE      0.         0.         174.       334.       629.      1413.      3245.      7360.
22 SE          ELEVATION    521.60     529.90     531.00     531.60     532.10     532.60     533.70     535.00
23 SS          SPILLWAY
                  CREL      529.90  SPILLWAY CREST ELEVATION
                 SPWID       52.00  SPILLWAY WIDTH
                  COQW        2.90  WEIR COEFFICIENT
                  EXPW        1.50  EXPONENT OF HEAD

24 ST          TOP OF DAM
                 TOPEL      531.60  ELEVATION AT TOP OF DAM
                DAMWID      140.00  DAM WIDTH
                  CCCO        2.70  WEIR COEFFICIENT
                  EXPD        1.50  EXPONENT OF HEAD

                                    ***

                                COMPUTED STORAGE-OUTFLOW CURVE
          STORAGE        0.0      115.00     136.00     150.00     165.00     172.00     197.00     225.00
          OUTFLOW        0.0        0.0      174.00     334.00     629.00    1413.00    3245.00    7360.00

                                HYDROGRAPH AT STATION       AS

 DA MON HRMN  ORD  OUTFLOW  STORAGE   STAGE    DA MON HRMN  ORD  OUTFLOW  STORAGE   STAGE    DA MON HRMN  ORD  OUTFLOW  STORAGE   STAG
  1      0000    1     200.    136.3   531.1     1      0535   68     924.    166.1   532.2     1      1110  135     302.    147.2   531.
  1      0005    2     185.    137.0   531.0     1      0540   69     823.    165.4   532.1     1      1115  136     302.    147.2   531.
  1      0010    3     172.    135.6   531.0     1      0545   70     761.    164.7   532.1     1      1120  137     302.    147.2   531.
  1      0015    4     163.    134.7   530.9     1      0550   71     736.    164.0   532.1     1      1125  138     302.    147.2   531.
  1      0020    5     154.    133.6   530.9     1      0555   72     706.    163.1   532.0     1      1130  139     301.    147.2   531.
  1      0025    6     147.    132.7   530.8     1      0600   73     675.    162.1   532.0     1      1135  140     301.    147.1   531.
  1      0030    7     140.    131.9   530.8     1      0605   74     643.    161.1   532.0     1      1140  141     301.    147.1   531.
  1      0035    8     133.    131.1   530.7     1      0610   75     612.    160.2   531.9     1      1145  142     301.    147.1   531.
  1      0040    9     128.    130.4   530.7     1      0615   76     583.    159.2   531.9     1      1150  143     301.    147.1   531.
  1      0045   10     123.    129.8   530.7     1      0620   77     556.    158.3   531.9     1      1155  144     301.    147.1   531.
  1      0050   11     118.    129.2   530.6     1      0625   78     531.    157.5   531.8     1      1200  145     301.    147.1   531.
  1      0055   12     114.    128.7   530.6     1      0630   79     508.    156.7   531.8     1      1205  146     301.    147.1   531.
  1      0100   13     110.    128.3   530.6     1      0635   80     488.    156.0   531.8     1      1210  147     301.    147.1   531.
  1      0105   14     107.    127.9   530.6     1      0640   81     469.    155.3   531.8     1      1215  148     301.    147.1   531.
  1      0110   15     104.    127.6   530.6     1      0645   82     452.    154.7   531.8     1      1220  149     301.    147.1   531.
  1      0115   16     102.    127.3   530.5     1      0650   83     436.    154.2   531.7     1      1225  150     301.    147.1   531.
  1      0120   17     100.    127.0   530.5     1      0655   84     423.    153.6   531.7     1      1230  151     301.    147.1   531.
```

1	0125	18	98.	126.0	530.5	*	1	0700	85	410.	153.2	531.7	*	1	1235	152	300.	147.1	531.5
1	0130	19	96.	126.6	530.5	*	1	0705	86	399.	152.7	531.7	*	1	1240	153	300.	147.1	531.5
1	0135	20	95.	126.5	530.5	*	1	0710	87	389.	152.4	531.7	*	1	1245	154	300.	147.1	531.5
1	0140	21	94.	126.4	530.5	*	1	0715	88	380.	152.0	531.7	*	1	1250	155	300.	147.0	531.5
1	0145	22	94.	126.3	530.5	*	1	0720	89	372.	151.7	531.7	*	1	1255	156	300.	147.0	531.5
1	0150	23	94.	126.3	530.5	*	1	0725	90	365.	151.4	531.6	*	1	1300	157	300.	147.0	531.5
1	0155	24	94.	126.3	530.5	*	1	0730	91	358.	151.1	531.6	*	1	1305	158	300.	147.0	531.5
1	0200	25	94.	126.4	530.5	*	1	0735	92	352.	150.8	531.6	*	1	1310	159	300.	147.0	531.5
1	0205	26	95.	126.4	530.5	*	1	0740	93	347.	150.6	531.6	*	1	1315	160	300.	147.0	531.5
1	0210	27	96.	126.6	530.5	*	1	0745	94	343.	150.4	531.6	*	1	1320	161	300.	147.0	531.5
1	0215	28	97.	126.7	530.5	*	1	0750	95	339.	150.2	531.6	*	1	1325	162	300.	147.0	531.5
1	0220	29	99.	126.9	530.5	*	1	0755	96	335.	150.0	531.6	*	1	1330	163	300.	147.0	531.5
1	0225	30	100.	127.1	530.5	*	1	0800	97	333.	149.9	531.6	*	1	1335	164	300.	147.0	531.5
1	0230	31	102.	127.3	530.5	*	1	0805	98	331.	149.7	531.6	*	1	1340	165	300.	147.0	531.5
1	0235	32	104.	127.6	530.6	*	1	0810	99	329.	149.6	531.6	*	1	1345	166	300.	147.0	531.5
1	0240	33	106.	127.8	530.6	*	1	0815	100	327.	149.4	531.6	*	1	1350	167	300.	147.0	531.5
1	0245	34	109.	128.1	530.6	*	1	0820	101	326.	149.3	531.6	*	1	1355	168	300.	147.0	531.5
1	0250	35	111.	128.4	530.6	*	1	0825	102	324.	149.1	531.6	*	1	1400	169	300.	147.0	531.5
1	0255	36	114.	128.7	530.6	*	1	0830	103	323.	149.0	531.6	*	1	1405	170	300.	147.0	531.5
1	0300	37	116.	129.0	530.6	*	1	0835	104	321.	148.9	531.6	*	1	1410	171	300.	147.0	531.5
1	0305	38	119.	129.4	530.7	*	1	0840	105	320.	148.8	531.5	*	1	1415	172	300.	147.0	531.5
1	0310	39	122.	129.7	530.7	*	1	0845	106	319.	148.7	531.5	*	1	1420	173	300.	147.0	531.5
1	0315	40	125.	130.0	530.7	*	1	0850	107	317.	148.5	531.5	*	1	1425	174	300.	147.0	531.5
1	0320	41	128.	130.4	530.7	*	1	0855	108	316.	148.4	531.5	*	1	1430	175	300.	147.0	531.5
1	0325	42	131.	130.8	530.7	*	1	0900	109	315.	148.3	531.5	*	1	1435	176	300.	147.0	531.5
1	0330	43	133.	131.1	530.7	*	1	0905	110	314.	148.3	531.5	*	1	1440	177	300.	147.0	531.5
1	0335	44	136.	131.5	530.8	*	1	0910	111	313.	148.2	531.5	*	1	1445	178	300.	147.0	531.5
1	0340	45	139.	131.8	530.8	*	1	0915	112	312.	148.1	531.5	*	1	1450	179	300.	147.0	531.5
1	0345	46	142.	132.2	530.8	*	1	0920	113	311.	148.0	531.5	*	1	1455	180	300.	147.0	531.5
1	0350	47	146.	132.6	530.8	*	1	0925	114	310.	147.9	531.5	*	1	1500	181	300.	147.0	531.5
1	0355	48	149.	132.9	530.8	*	1	0930	115	310.	147.9	531.5	*	1	1505	182	300.	147.0	531.5
1	0400	49	152.	133.4	530.9	*	1	0935	116	309.	147.8	531.5	*	1	1510	183	300.	147.0	531.5
1	0405	50	156.	134.1	530.9	*	1	0940	117	308.	147.7	531.5	*	1	1515	184	300.	147.0	531.5
1	0410	51	169.	135.4	531.0	*	1	0945	118	307.	147.7	531.5	*	1	1520	185	300.	147.0	531.5
1	0415	52	193.	137.7	531.1	*	1	0950	119	307.	147.6	531.5	*	1	1525	186	300.	147.0	531.5
1	0420	53	235.	141.3	531.2	*	1	0955	120	306.	147.6	531.5	*	1	1530	187	300.	147.0	531.5
1	0425	54	298.	146.6	531.5	*	1	1000	121	306.	147.5	531.5	*	1	1535	188	300.	147.0	531.5
1	0430	55	420.	153.6	531.7	*	1	1005	122	305.	147.5	531.5	*	1	1540	189	300.	147.0	531.5
1	0435	56	661.	162.3	532.0	*	1	1010	123	305.	147.5	531.5	*	1	1545	190	300.	147.0	531.5
1	0440	57	1515.	170.1	532.5	*	1	1015	124	305.	147.4	531.5	*	1	1550	191	300.	147.0	531.5
1	0445	58	2164.	175.7	532.8	*	1	1020	125	304.	147.4	531.5	*	1	1555	192	300.	147.0	531.5
1	0450	59	2606.	179.8	532.9	*	1	1025	126	304.	147.4	531.5	*	1	1600	193	300.	147.0	531.5
1	0455	60	2866.	182.5	533.1	*	1	1030	127	304.	147.3	531.5	*	1	1605	194	300.	147.0	531.5
1	0500	61	2858.	182.2	533.0	*	1	1035	128	303.	147.3	531.5	*	1	1610	195	300.	147.0	531.5
1	0505	62	2533.	179.1	532.9	*	1	1040	129	303.	147.3	531.5	*	1	1615	196	300.	147.0	531.5
1	0510	63	2163.	175.5	532.6	*	1	1045	130	303.	147.3	531.5	*	1	1620	197	300.	147.0	531.5
1	0515	64	1831.	172.2	532.6	*	1	1050	131	303.	147.3	531.5	*	1	1625	198	300.	147.0	531.5
1	0520	65	1462.	169.7	532.4	*	1	1055	132	302.	147.2	531.5	*	1	1630	199	300.	147.0	531.5
1	0525	66	1228.	166.1	532.3	*	1	1100	133	302.	147.2	531.5	*	1	1635	200	300.	147.0	531.5
1	0530	67	1052.	167.0	532.2	*	1	1105	134	302.	147.2	531.5	*						

PEAK OUTFLOW IS 2866. AT TIME 4.92 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	16.58-HR
2866.	4.92	(CFS)	661.	385.	385.	385.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	326.	527.	527.	527.

PEAK STORAGE (AC-FT)	TIME (HR)		6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	16.58-HR
182.	4.92		156.	146.	146.	146.

PEAK STAGE (FEET)	TIME (HR)		6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	16.58-HR
533.06	4.92		531.82	531.38	531.38	531.38

CUMULATIVE AREA = 0.0 SQ MI

BUDGET SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	300.	0.33	300.	298.	298.	0.0		
ROUTED TO	A2	3178.	4.92	683.	391.	391.	0.0	536.63	4.08
ROUTED TO	A5	2666.	4.92	661.	385.	365.	0.0	533.06	4.92

SUMMARY OF DAM OVERTOPPING/BRE... ANALYSIS FOR STATION A2

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	535.00	535.00	536.50
STORAGE	154.	154.	212.
OUTFLOW	0.	4712.	6832.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	536.83	0.03	216.	3178.	0.37	4.92	3.92

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	531.10	529.90	531.50
STORAGE	150.	115.	182.
OUTFLOW	200.	0.	344.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	533.06	1.46	182.	2660.	3.50	4.92	0.0

*** NORMAL END OF JOB ***

APPENDIX 6
REFERENCES

KAMPFE LAKE DAM

APPENDIX 6
REFERENCES

KAMPFE LAKE DAM

Anderson-Nichols & Co., Inc., Star Lake Phase I Report, National Dam Inspection Program, February 1980.

Chow, Ven Te, Open Channel Hydraulics, McGraw Hill Book Company, New York, 1959.

King, H.W. and E.F. Brater, Handbook of Hydraulics, McGraw Hill Book Company, New York, Fifth Edition 1963.

Lewis, J.V. and H.B. Kummel (1910-1912) Geologic Map of New Jersey, revised by H.B. Kummel, 1931, and by M.E. Johnson, 1950. New Jersey Department of Conservation of Economic Development Atlas.

Salisbury, Kummel, H.B., Peet and Whitson, Glacial Drift Map of New Jersey, 1902.

Schway, G.O., R.K. Frevert, T.W. Edmister, and K.K. Barnes, Soil and Water Conservation Engineering, The Ferguson Foundation Agricultural Engineering Series, John Wiley and Sons, Inc., New York, 1966, 683 pp.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, Flood Hydrograph Package (HEC-1) Users Manual Preliminary, Davis, California, March 1981.

U.S. Department of Agriculture, Soil Conservation Service, Urban Hydrology for Small Watersheds, Technical Release No. 55, Washington, 1975.

U.S. Department of Commerce, Weather Bureau, "Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1000 Square Miles and Durations of 6, 12, 24, and 48 Hours", Hydrometeorological Report No. 33, Washington, 1977, 816 pp.

United States Department of Interior, Bureau of Reclamation, Design of Small Dams, U.S. Government Printing Office, Washington, 1977, 816 pp.

U.S. Department of Interior, Geological Survey, 7.5-Minute Series (topographic) maps, scale 1:24000, Contour Interval 10 feet: Wanaque, New Jersey, (1954).

Viessman, Warren, Jr., J.W. Knapp, G.L. Lewis, T.E. Harbaugh, Introduction to Hydrology, Harper and Row, Publishers, New York, Second Edition 1977, 704 pp.

END

DATE
FILMED

9 - 81

DTIC